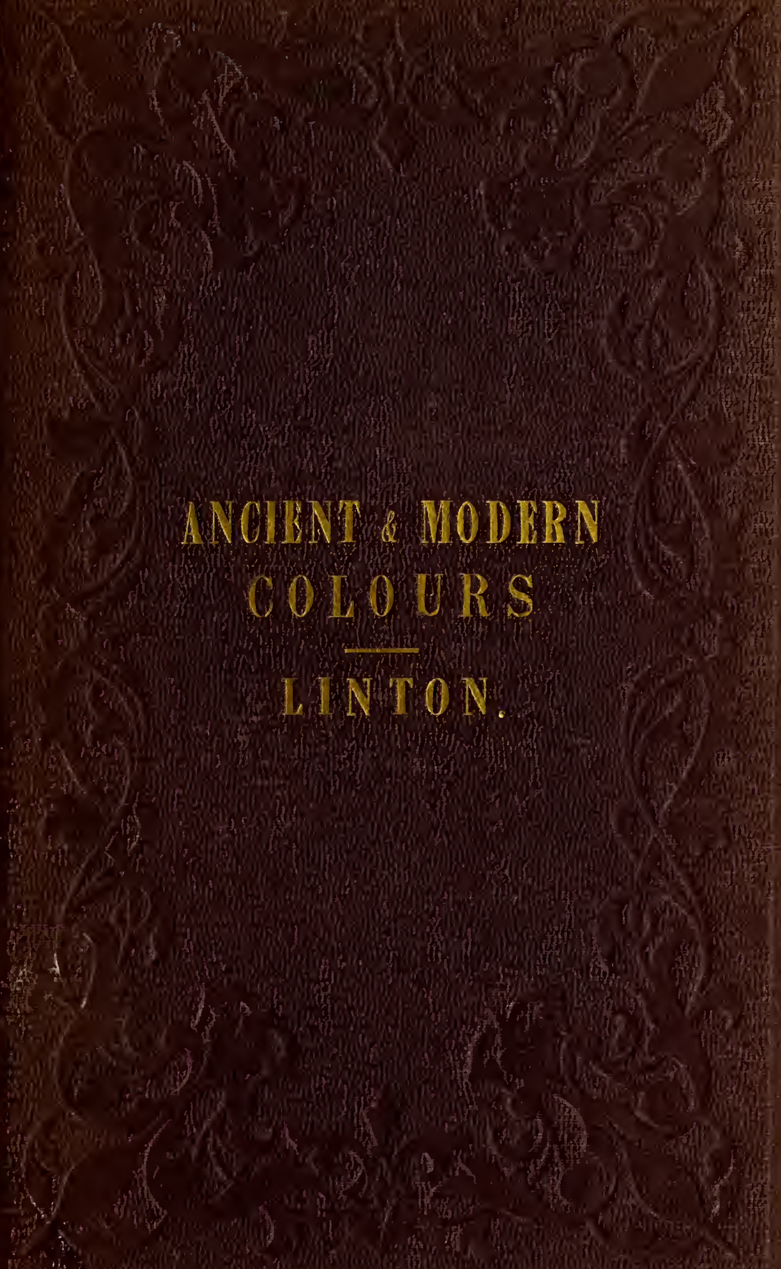

ANCIENT & MODERN COLOURS

LINTON.

H. St. Clair Morford

April 30. 1902

ANCIENT AND MODERN COLOURS,

FROM THE EARLIEST PERIODS
TO THE PRESENT TIME:

WITH THEIR

CHEMICAL AND ARTISTICAL PROPERTIES.

BY

WILLIAM LINTON.

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TO

HIS ROYAL HIGHNESS PRINCE ALBERT, K.G.

PRESIDENT OF THE GREAT EXHIBITION OF 1851,

AND OF THE

ROYAL COMMISSION OF FINE ARTS,

&c. &c. &c.

A SUMMARY OF THE COLOURS, &c.

WHICH WERE

KNOWN TO THE ANCIENTS.

ANCIENT COLOURS, &c.

This Digest professes to unite the Ancient Colours which are recorded in history, with those which have been revealed by the researches and investigations of Travellers and Men of Science. Among the contributors to our stock of knowledge on this subject, Sir Humphrey Davy stands preeminent, more especially in reference to the Colours of the Roman period; whilst the excavations prosecuted in Assyria and Egypt, by Layard, Rawlinson, Botta, Wilkinson, and other eminent antiquarians, assisted by chemical examinations, have extended our acquaintance with colouring matters to the remotest periods.

Many deficiencies in the few ancient Chronicles which have come down to us have been supplied by the researches alluded to; and in numerous instances those researches will be found to confirm the ancient records.

Lodge Place,
St. John's Wood.

INDEX TO ANCIENT COLOURS, &c.

WHITES.

			PAGE
White Lead	Ψιμύθιον	Cerussa	1

YELLOWS.

Massicot			2
Yellow Ochre	Ὤχρα	Ochra	2
Holochrysi	Ἑλίχρυσον	Holochrysi	3
Yellow Orpiment	Ἀῤῥενικόν	Auripigmentum	3

REDS.

Red Orpiment	Σανδαράκη	Sandaracha	4
Vermilion	Κιννάβαρι	Cinnabar	5
Dragon's Blood	Κιννάβαρι ἰνδικόν		7
Red Lead	Ἄμμιον	Minium (*hod.*)	7
Burnt Ochre	Μίλτος τεχνίκος	Ochra usta, and Marmorosum	8
Indian Red	Μίλτος σινωπική	Rubrica Sinopica	8
Tyrian Purple	Πορφύρα	Ostrum	12
Trumpet-fish Purple	Κήρυξ	Buccinum	15
Madder Red	Ἐρυθρόδανον	Rubiæ Radix	16
Cochineal	Κόκκος	Coccus cacti	17
Scarlet Grain		Coccus ilicis	17
Hysginum Purple	Ὕσγινον	Hysginum	18
Violet		Viola	18
Sea-weed Purple	Πόντιον Φύκος	Fucus marinus	19
Brezil-wood Red			20

BLUES.

Woad Blue	Ἰσατις ἥμερος	Glastum	20
Ultramarine	Σάπφειρος		21
Native Cyanus	Κύανος ἀυτοφυὴς	Cæruleum	21
Bluebottle		Cyani colos	22
Alexandrian or Assyrian Blue	Κύανος τεχνήτος	Cyanus Egyptius	22
Lomentum		Tritum	24
Cobalt			25
Indigo	Ἰνδικόν	Indicum	25

GREENS.

			PAGE
Malachite	Χρυσοκόλλα	Chrysocolla	26
Terre Verte	Θεοδότιον	Terra viridis	27
Prasius Green	Πρασίτης	Prasius Lapis	28
Appian Green		Appianum	28
Alexandrian Green		Viride Alexandrinum	28
Verdigris	Ἰὸς	Ærugo	28

BROWNS.

Asphaltum	Ἰουδαϊκός Λίθος	Bitumen Judaicum	29
Jet	Γαγάτης	Gagates Lapis	29
Thracian Stone	Θρακίας λίθος	Thracius Lapis	29
Ampelitis Earth	Αμπελῖτις γῆ	Ampelitis	29
Liquid Bitumen	Πιττάσφαλτος	Pissasphaltos	30
Three Browns (Davy)		Cicerculus	30

BLACKS.

Blue Black	Τρύγινον	Fæcatum	31
Indicum	Ἰνδικόν μέλαν	Indicum	32
Ivory Black	Ελεφάντινον	Elephantinum	32
Bone Black	Μέλαν	Atramentum	32
Lamp Black	Λσβόλη	Fuligo	32
Manganese Black			33
Mineral Black	Μελαντηρία	Atramentum	33
Antimony Black	Στίμμι	Stibium	33

OILS.

Walnut Oil	Καρύϊνον	Caryinum	34
Poppy Oil	Μήκωνον	Papavereum	34
Castor Oil	Κίκινον	Cicinum	35

ESSENTIAL OILS.

Turpentine	Πισσέλαιον	Picinum Oleum	35
Cedar	Κεδρέλαιον	Pisselæon	36
Naphtha	Νάφθα	Naphtha	36

DRIERS.

Litharge	Λιθάργυρος	Molybditis	36
White Lead	Ψιμμίθιον	Cerussa	37

DRY RESINS.

			PAGE
Turpentine	Τέρμινθος	Terebinthus	37
Mastic	Μαστίχη	Lentescina	37
Frankincense	Λίβανος	Thus	37
Dry Pitch	Πίσσα ξηρὰ	Pix sicca	38
Amber	Ἤλεκτρον	Succinum	38

LIQUID RESINS.

Larch	Πεύκη	Larix	38
Liquid Pitch	Πίσσα ὑγρὰ	Pix Liquida	39
Liquid Bitumen	Μέλαν	Atramentum	39
Wax	Κηρὸς	Cera	39

ANCIENT COLOURS.

WHITES.

Ψιμύθιον.[1] *Cerussa*.[2] White Lead.

Carbonate of Lead was chiefly made at Rhodes, Corinth, Sparta, and Puteoli:[3] the best at Rhodes. Before the invention of this metallic white, the earths of Eretria in Eubœa, of Prætonium in Egypt, of Crete and Cyrene, together with those of Melina and Annulare (Creta argentaria) were employed.

White Lead made by acids superseded them. "Nunc omnis ex plumbo et aceto fit, ut diximus."[4]

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[1] Theophrastus. Galen. *Ψιμμίθιον*—Dioscorides.

[2] Pliny. Vitr.

[3] Dioscor.

[4] Pliny, xxxv. 6; also see Theophrastus, *περὶ λίθων*; Vitruvius, vii, 12; and Dioscorides, v. 103; in each of which the process of making White Lead is described.

YELLOWS.

MASSICOT.

Yellow protoxide of Lead, or partially calcined Cerussa, was found by Sir Humphry Davy in the Baths of Titus. "It is probable," says the same author, "that the ancients used many colours from Lead, of different tints, between the "usta" (burnt) of Pliny, (our Minium) and imperfectly decomposed (half-burnt) Cerussa, —a pale Massicot."[1]

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[1] Philosophical Transactions, 1815; or Davy's Works, edited by his brother.

Ὤχρα.[1] *Ochra.*[2] YELLOW OCHRE.

The Attic Sil, or Yellow Ochre (which is found in the silver mines between Thoricos and Sunium) is the brightest and the best,[3] as well as the most costly. It should be imponderable, yellow throughout, full of colour, free from grit, friable, and of Attic production.[4] The next in quality is Marmorosum, a stony Ochre.[5]

The ancient painters preferred the Red and Yellow Ochres to Orpiment.[6] Polygnotus and Micon used Attic

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[1] Theophrastus, Dioscorides. [2] Pliny. [3] Vitruvius, vii. 7.

[4] "*Ὤχραν δὲ ληπτέον τὴν κουφοτάτην, καὶ μηλίνην διόλου· κατακορῆ δὲ καὶ ἄλιθον καὶ εὐθρυβῆ—Ἀττικην δὲ τῳ γένει.*"—*Diosc.* v. 108.

[5] "Proximum marmorosum."—*Pliny*, xxxiii. 12.

[6] "*Καὶ ὤχραν ἀντ' ἀῤῥενικοῦ, διὰ τὸ μηδὲν τῃ χρόᾳ διαφέρειν, δοκεῖν δέ.*"—*Theophr. π. λ.*

Sil only.[7] There is a bright Sil from France also, but it is of little value.[8] Sil of Scyros, Syricum, or Pressum; of Lydia, and of Achaia (a darker colour), are used for shadows.[9] A large earthen pot of Yellow Ochre was found in the Baths of Titus by Sir Humphry Davy; who says the Aldobrandini yellows are all ochres. The yellow on the Egyptian monuments is an Iron Ochre.[10] M. Chaptal found four natural Ochres at Pompeii.[11] M. Flandin states that he could trace, on the bas-reliefs of Khorsabad (Nineveh) a tint of Yellow Ochre on all the parts not otherwise painted, as if this colour had formed a general ground.[12]

"’Ελιχρύσον,"—Dioscorides.[13] Pliny also mentions a vegetable yellow colour, "*holochrysi*." [14]

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[7] Pliny, xxxiii. 7.

[8] *Id.* xxxiii. 12.

[9] "Quo utuntur ad picturæ umbras."—*Id.* xxxiii. 12.

[10] Dr. Ure, in Wilkinson.

[11] Chaptal, *Annales de Chymie*, &c.

[12] Voyage Archæologique à Ninève.—*Révue de deux Mondes.*

[13] iv. 57.

[14] xxi. 8, Heliochrysum, &c., xxi. 25.

’Αῤῥενικόν.[1] *Auripigmentum.*[2] YELLOW ORPIMENT.

A native Sulphuret of Arsenic: the golden colour is the best.[3] It comes from Mysia, and is dug up also in Syria,[4] as well as in Pontus.[5] It is found in the same metals as Sandarach or Red Orpiment.[6] Theophrastus mentions Arsenic among painters' colours.[7] Davy found it in the Baths of Titus.[8]

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[1] Theophrastus. *’Αρσενικόν*—Dioscorides.

[2] Pliny. Vitr.

[3] "Quod optimum, colori etiam in auro, excellentius."—*Pliny*, xxxiv. 18.

[4] *Id.* xxxiii. 4.

[5] Vitruv. vii. 7.

[6] "*’Αρσενικόν κατὰ τὰ αὐτὰ γεννᾶται μέταλλα τῇ σανδαράχη,*"

&c.—*Diosc.* v. 121.—" Sandaracham et Arsenicum ex eadem est materia."—*Pliny,* xxxiv, 18.

[7] Περὶ λίθων.

[8] Davy's Works. Beckman states that " Arsenic was not known to the Ancients." *! !—History of Inventions,* vol. ii. p. 338; translated from the German by Johnston. London, 1817; also index, p. 512.

REDS AND PURPLES.

Σανδαράκη.[1] *Sandaracha.* RED ORPIMENT.

Realgar. The native Yellow Sulphuret heated. Sandarach is produced in an island called Topazas, in the Red Sea;[2] and it is also found in other places; but the best is dug in Pontus,[3] and approaches Vermilion in colour.[4] It is found in silver and gold mines.[5] The Greeks called Red Arsenic, Sandarach (*Σανδαράκη*). Vitruvius called Red Lead, Sandarach, (perhaps from its resemblance to that colour.[6]) Pliny notices a factitious Sandarach, Calcined Ceruse, or Red Lead.[7] He also gives a third colour of Arsenic, between Sandarach and Yellow Arsenic,—(" Fit et tertium genus, quo miscetur

[1] Dioscorides, Galen, Theophrastus.

[2] " Juba tradit in insula Rubri Maris topazo nasci."—*Pliny,* xxxv. 6. " Melius quo magis rufa."—*Id.* xxxiv. 18.

[3] Vitruvius, vii. 7.

[4] " Κινναβαρίζουσαν τῆν χρόαν."—*Diosc.* v. 122; *Theoph. π. λ.*

[5] " Sandaracha invenitur in aurariis et in argentariis metallis."—*Pliny,* xxxiv. 18.

[6] " Cerussa, quum in fornace coquitur, mutato colore ad ignis incendium, efficitur Sandaracha."—*Vitr.* vii. 12.

[7] " Fit et adulterina ex cerussa in fornace cocta."—*Pliny,* xxxv. 6.

aureus color Sandaracha," xxxiv. 18.)[8] Calcined Sinoper and Sandarach, equal parts, make Pliny's Sandyx.[9] Sandyx and Sinoper make the artificial Syricum of the same author.[10]

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[8] Sulphur unites with Arsenic in at least three proportions, forming compounds, two of which occur in the mineral kingdom, and are well known by the names of Realgar and Orpiment."—Dr. Turner's *Elements of Chemistry*, by Liebig and Gregory, 1842.

[9] "Hæc [cerussa usta, or red lead] si torreatur æqua parte rubrica admixta sandicena facit."—*Pliny*, xxxv. 6.

[10] Fit autem [Syricum factitium] Sinopide et Sandice mixtis."—*Pliny*, xxxv. 6.

Κιννάβαρι.[1] *Cinnabar.*[2] VERMILION.

Native Cinnabar, or Vermilion, a Sulphuret of Mercury, was first prepared by Kallias the Athenian, 500 years before the Christian Æra.[3] There is a Minium, or Cinnabar, wrought in Spain, from stone mixed with silver sand; also in Colchis, where they disengage it from the fronts of the high cliffs, by shooting arrows at them.[4]

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[1] Dioscor. Theophr. [2] Pliny.

[3] "*Θέντες γὰρ ἐπὶ λοπάδος κεραμέας κόγχον σιδηροῦν ἔχοντα κιννάβαρι, περικαθάπτουσιν ἄμβικα περιαλείψαντες πηλῷ, εἶτα ὑποκαίουσιν ἄνθραξιν· ἡ γὰρ προσίζουσα τῳ ἄμβικι αἰθάλη ἀποζεσθεῖσα καὶ ἀποψυχθεῖσα, ὑδράργυρος γίνεται.*"—*Diosc.* v. 110; *Pliny*, xxxiii. 8. "Imposita siquidem patinæ fictili concha ferrea cinnabari continenta, calycem seu operculum adaptant, quod undique luto superillinunt, deindeque carbonibus succendunt. Tum quæ calyci adhærescit fuligo, derasa refrigerataque, in argentum vivum coit." This is a tolerably conclusive proof that the ancients were not ignorant of the process of sublimation.

[4] "*Γίνεται δὲ καὶ κιννάβαρι τὸ μὲν αὐτοφυὲς τὸ δὲ κατ' ἐργα-*

Pliny and Vitruvius call it Minium; and Dioscorides observes that it was falsely thought by some to be the same as Minium.[5] Vermilion is the colour with which the statues of the gods were painted. It was abundant in Caramania, also in Ethiopia; and was held in high honour among the Romans. Their heroes rode in triumph with their bodies painted with Vermilion; and the faces of the statues of Jupiter were coloured with this pigment on festal days.[6] The monochrome pictures of the ancients were wrought with it. There was also an artificial kind of Cinnabar, a shining scarlet sand, from above Ephesus.[7]

Vitruvius and Pliny say that Vermilion was injured by the light of the sun and moon. To prevent this result the colour was varnished by a mixture of wax and oil.[8]

Sir Humphrey Davy found Vermilion in the Baths of Titus.[9]

σίαν· αὐτοφυὲς μὲν τὸ περὶ Ἰβηρίαν, σκληρὸν σφόδρα καὶ λιθῶδες, καὶ τὸ ἐν Κόλχοις." "*Τοὺτο δέ φασιν εἶναι* (*ἐπὶ*) *κρημνῶν, ὃ καταβάλλουσι τοξεύοντες.*"—*Theophrastus; Pliny*, xxxiii. 7. "Ἐκ *λίθου τινὸς μεμιγμένου τῇ ἀργυρίτιδι ψάμμῳ.*"—*Diosc.* v. 109.

[5] "Κιννάβαρι *οἴονταί τινὲς ταυτὸν ὑπερέχειν τῳ καλουμένῳ ἀμμίῳ.*"—*Diosc.* v. 109.

[6] "Enumerat auctores Verrius, quibus credere sit necesse, Jovis ipsius simulacri faciem diebus festis minio [Vermilion] illini solitam, triumphantumque corpora: sic Camillus triumphasse."......" Cinnabari veteres, quæ etiam nunc vocant monochromata, pingebant."—*Pliny*, xxxiii. 7.

[7] "Τὸ *δὲ κατ' ἐργασίαν ὑπὲρ* Ἐφέσου *μικρὸν ἐξ ἑνός τόπου μόνον.* Εστι *δ' ἄμμος, ἥν συλλέγουσι λαμπυρίζουσαν, καθάπερ ὁ κόκκος.*" —*Theophr.; Vitr.* vii. 8; *Pliny*, xxxiii. 7.

[8] "Solis atque lunæ inimicus; remedium, ut parieti siccato cera punica cum oleo liquefacta candens setis inducatur," &c.—*Pliny*, xxxiii. 7; *Vitr.* vii. 9.

[9] Davy's *Colours*, &c.

Κιννάβαρι ἴνδικόν.[1] DRAGON'S BLOOD.[2]

There was a dark resinous red colour from India called *κιννάβαρι* (according to Pliny, the true Cinnabar) in ancient times.

[1] "*Γίνεται καὶ ἐν αὐτῇ καὶ κιννάβαρι, τὸ λεγόμενον ἴνδικόν, ἀπο τῶν δένδρων ὡς δάκρυ συναγόμενον.*"—*Arrian, in periplo*, c. 10.

[2] "Dragon's blood, or, when pure, Draconina, is obtained from the gum resin so called, which is produced by several species of calamus, also by Dracœna draco and Pterocarpus draco."—*Dr. Turner.*

Ἄμμιον.[1] *Minium* (*hod.*) RED LEAD.

Burnt Massicot, a Sesquioxide of Lead; first used by Nicias.[2] The Asiatic is now the best. Red Lead is Sandyx.[3] Dioscorides says that Red Lead is the Sandyx of some authors.[4] Some call Minium Cinnabar.[5] Pliny and Vitruvius call Red Lead Sandarach,[6] and the latter says that it is better than the native Sandarach, or Red Orpiment.[7] Davy found Minium (Red Lead) in the Baths of Titus, and says that the ancients used many shades of burnt Cerussa, or White Lead.[8] When Pliny and Vitruvius speak of Minium, they mean Vermilion.

[1] Dioscorides.

[2] "Usta casu reperta incendio Piræi, cerussa in orcis cremata."—*Pliny*, xxxv. 6.

[3] Galen.

[4] "Τὸ *δὲ οὕτω σκευασθὲν σάνδυξ, ὑπό τινὼν λέγεται*," v. 103; in which see process.

[5] "Minium quidem cinnabari."—*Pliny*, xxxiii. 7.

[6] "Cerussa sane usta, quam et Sandaracham quidam vocitarunt."—*Celsus*, vi. 6.

[7] "Et ea multo meliorem usum præstat quam quæ de metallis per se nata fodatur."—*Vitr.* vii. 12.

[8] Davy's Works.

Μίλτος[1] (*τεχνίκος*). *Ochra usta.*[2] BURNT OCHRE.

Burnt Yellow Ochre quenched with Vinegar, "efficitur purpureo colore."[3] The greater the heat applied, the deeper and more fiery the colour.[4] Burnt Ochre is much used by painters for shadows.[5] It is another colour of the class (Μίλτος) so familiar to the ancients; and is said by Theophrastus to have been first used by Kidias.[6] This colour, united to Sandarach, made Pliny's Sandyx. "At Rome, Red Lead is imitated by burnt Marble flushed with acid."[7] There is a picture on the walls of Pompeii painted with Red and Yellow Ochres.[8]

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[1] Theophrastus.—"*Γίνεται μίλτος καὶ ἐκ τῆς ὤχρας κατα καιομένης*;"—Περὶ λίθων; also Dioscorides, Τεκτονική.—*Id.*

[2] "Et picta coloribus ustis."—*Ovid, Fasti,* 10; "Tabulasque coloribus ustis."—*Id.*

[3] Vitr. vii. 11; Pliny, xxxv. 6.

[4] "*Ὅσῳ δ' ἄν μᾶλλον πυρωθῶσι, τοσούτῳ μᾶλλον μελαντέραν καὶ ἀνθρακωδεστέραν ποιοῦσι.*" *Theophrastus, περὶ λίθων.*

[5] "Sine usta non fiunt umbræ."—*Pliny,* xxxv. 6.

[6] Id., et Theophrastus.

[7] "Fit et Romæ cremato sile marmoroso, et restincto aceto."—*Pliny,* xxxv. 6.

[8] Davy.

Μιλτος[1] *Σινοπική.*[2] } *Rubrica*[3] *Sinopica.* } NATIVE RED OCHRE.

Native Sinoper, a red earth or Ochre of various tints and qualities, from the purple-tinged Indian Red to the common Reddle or earthy Bole. It was called Μίλτος by the Greeks, and Rubrica by the Romans. "The first comes from Sinope, a city of Pontus in Cappadocia; the best from Lemnos. It is also found in Egypt and Spain.[4] Rubrica is also made from burnt Ochres, an invention of Kidias, but its quality is considered inferior.[5]" Pliny says there are three different qualities of Sinoper (μίλτος).

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[1] Theophrastus; Galen; Dioscorides.

[2] Dioscorides.

[3] Pliny.

In many of the frescoes of the earliest Egyptian tombs scarcely any colours are employed besides those which may be produced by ferruginous combinations: the reds, browns, and yellows, being all Ochres. The ruins of Nineveh also exhibit abundant evidence of the familiarity of the Assyrians with the earthy oxides, as well as with other colours.[6] The prows of Ulysses' ships were painted with Red Ochre ("μιλτοπάρηοι," *Il.* ii.) Pliny mentions an Armenian Bole, a coarse red earth.[7] Davy found a purplish red and a dull red, in the Baths of Titus, which were both Ochres; and in the Nozze Aldobrandini he says the reds are all Ochres.

[4] Diosc. v. 3; Pliny, xxxv. 6; Vitr. vii. 7. "*Βελτίστη δὲ δοκεῖ μίλτος ἡ Κεία εἶναι.*"—*Theoph. π. λ.*

[5] "*Γίνεται δὲ καὶ ἐκ τῆς ὤχρας καταχαιομένης, ἀλλὰ χείρων· τὸ δ' εὕρημα Κυδίου.*"—*Id.*

[6] See Notes below, on Assyrian and Egyptian Colours.*

[7] xxxv. 6.

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* ASSYRIAN COLOURS.—The colours which have revealed themselves during Dr. Layard's excavations at Nineveh display sufficient evidence that they are not inferior to those of the ancient Egyptians, either in number, variety, or brilliancy. Instead of the common earthy Bole or Reddle of the latter people, the Assyrians have left us a colour almost equal to Vermilion itself. The monochrome pictures, which represented the Chaldæans on the wall (Ezekiel xxiii. 14), are said by Gesenius, the Septuagint, and the Vulgate, to have been painted with

Sinoper or Rubrica (μίλτος), a native earthy oxide, like Indian Red; whilst both the great English versions of the Bible now in use, as well as the Rabbis, translate the word at issue ("Shashar," Jeremiah xxii. 14) Vermilion. At Khorsabad it appears that the Red approached in hue to that brilliant colour, whilst the sculptures at Nimroud exhibited a bright Crimson or Lake tint. Dr. Layard thinks there is no doubt of their having made great use of vegetable colours, the materials for which are so plenteous in the vicinity of Nineveh. The rapid evanescence of some specimens of blue and red on plaster, which were bright and perfect in colour when first exposed, would appear to favour a vegetable origin, as no susceptibility of the kind is known to characterise any mineral Reds or Blues with which we are at present acquainted.

Dr. Layard claims, for the older Assyrian period, the same colours which have been attributed to the early times of the Egyptians, viz.—Blue, Red, Yellow, Black, and White.[1] He also speaks of a Green on the earlier monuments of Nimroud; and of Green, Purples, Violet, Brown, &c. enamelled in paintings of figures on bricks, at the north-west palace.

In allusion to the analysis of Sir Gardner Wilkinson's specimens of the Alexandrian Blue, by Dr. Ure, Dr. Layard conjectures that the colouring principle may be the same, but affirms that the Assyrian blue is much brighter. He concludes that the colour was derived from copper, as he found an old mine of that ore in the neighbourhood of Nineveh.

The Doctor considers the Greens of Assyria to be similar to those of Egypt, which are in many instances composed of Iron Ochre and Copper Blue. The Yellows and Blacks, also, he conceives to resemble those from Egypt; and as specimens of the latter class of pigments, he mentions Calcined Bone, and Black Iron Ochre. The Whites are of Alabaster and Gypsum.

At Khorsabad, the French antiquarian, M. Botta,[2] found Green, Red, Black, White, Yellow, and Blue; the latter very lively in colour.

Since writing the above, a small portion of the Blue colour has been analyzed by Mr. Warrington. It proves to be a Silicate of

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[1] See Wilkinson's Ancient Egyptians.

[2] Lettres de M. Botta sur les découvertes à Khorsabad, &c. &c. Paris, 1845.

Copper, doubtless identical with the celebrated Alexandrian Blue, first invented by a king of Egypt, and so much esteemed by the ancients:—the κύανος τεχνήτος of Theophrastus. The brilliancy and power of this ancient colour have not yet been equalled by modern chemists.

Egyptian Colours.—*Blues.*—"Sandy texture,—blue glass. On a chemical examination of this vitreous matter the presence of copper became evident."—*Dr. Ure*, in Wilkinson. "All appear to be oxides of Copper: no analysis showed Cobalt; merely Copper and a little Iron."—*Prof. John.*[1] Indigo was found on Mummy cloths.[2]

Reds.—"A mere earthy Bole."—*Dr. Ure.* "There were brown reds and brick-coloured reds. The Brown colour often occurs in the faces of the figures painted on Mummy cases,—a brown-red Oxide of Iron, mixed with Lime. Cinnabar was the substance with which the statues of the Ethiopian gods were coloured. Red ochrous earths were employed by the painters. The mummy-cloths showed a reddish coloured dye from Madder, which was badly separated from the Yellow."—*Prof. John.*

Yellows.—"A yellow Iron Ochre."—*Dr. Ure.* "Are often very pure, and of a bright sulphur-colour:—such were vegetable colours. Yellow Ochres were also employed by the painters."—*Prof. John.*

Greens.—"Blue glass in powder, with a little ochre." "The green pigment scraped from a painting in distemper, resisted the solvent action of muriatic acid, but became thereby of a brilliant blue colour, in consequence of the abstraction of a small portion of Yellow Ochrous matter from the artificial Cyanus of Theophrastus."—*Dr. Ure.* "Those on the stuccos and the catacombs at Thebes are a mixture of a yellow vegetable pigment with a Copper Blue, and held on by glue-water. The vegetable yellow might possibly be the Hennè plant, still much used in the East."—*Prof. John.*

Blacks.—"Calcined bones."—*Dr. Ure.* "The lees of wine calcined, burnt pitch, charcoal, and soot."—*Prof. John.*

Whites.—"A very pure chalk."—*Dr. Ure.* "Lime and gypsum."—*Prof. John.*

"The ancients practised *Calico printing* in a manner similar to the moderns."—*Davy.*

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[1] Egyptian Antiquities.

[2] See an account of Mummy-cloths by Jas. Thomson, Esq., F.R.S.

"De la *soie teinte* en couleurs qui n'ont rien perdu de leur vivacité, malgré trente siècles écoulés depuis ce temps-là."[2]

"The mummies without number, which have been preserved to us through so long a succession of ages, should be enough to obtain for the Egyptians the glory of having carried chemistry to a degree of perfection attained by very few. There is, in the mummies only, an assemblage of chemical operations of which some are even yet unknown, notwithstanding the endeavours of the most experienced moderns to reproduce them."[3]

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[2] Origine des découvertes attribuées aux Modernes, par M. L. Dutens, (p. 179.) London, 1796.

[3] Idem.

Πορφύρα.[1] *Ostrum.*[2] TYRIAN PURPLE.

The renowned Tyrian dye was taken from a white vein in the throat of the shell fish Purpurea.[3] It was of a dark-red colour, resembling a deep rose. The Purpuræ of the best description were chiefly found on the rocks of Tyre, on the coast of Asia; they were also caught at Meninge, on the Gætulan shores, in Africa; and on the coast of Laconia, in Europe.[4] The colour varied according to the locality in which the purple fishes were taken. Those from Pontus and Galatia, being in the north, produced a black dye; in the equinoctial regions a violet hue predominated; whilst in the south, as at Rhodes,[5] the colour was of a richer red. These purple fishes were also called Pelagia; and they were distinguished by the district, as well as by the food which the district supplied. The Lutense lived in the mud; the Algense on seaweed, the worst kind of all; and the Taniense, which frequented the bays and coasts, yielded the best, though not the deepest in colour. "There are also the Calculosæ, which live in the gravel or shingly bottoms; and, last and most esteemed among the whole, the Dialeta, which are confined by their habits to no particular shore or food."[6] Aristotle states that the largest fish come from the north, which are of a dark colour; and the smaller ones from the south, which are of a brighter red or yellow colour.[7] Two hundred Buccina were added to one hundred and eleven Pelagian purples, to make the purple colour so much eulogized by Pliny, and one of the three shades of purple recorded by the ancients.[8]

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[1] Theophrastus. Dioscorides.

[2] Vitruvius.

[3] "Sed Purpuræ florem illum tingendis expetitum vestibus, in mediis habent faucibus. Liquoris hic minimi est in candida vena, unde pretiosus ille bibitur, nigrantis rosæ colore sublucens."—*Pliny*, ix. 36.

[4] Pliny, ix. 36; Pausanias, in Laconica, p. 202.

The second of the three shades was the Punic or Phœnician Purple Red of Tyre and Tarentum,—*Φοινικίδα*. The third was Conchyliata, made with Buccina alone; a violet tint, like that of the sea slightly agitated (and in shade).

When Cornelius Nepos was young (in the time of Augustus), the Violet colour prevailed; not long afterwards the Red Tarentine Purple was in vogue;[9] and to this succeeded the double-dyed (διβαφη) Tyrian; to which Horace alludes,—

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[5] Vitr. vii. 13.

[6] Pliny, ix. 37.

[7] Hist. Anim. v. 15, p. 128, *et seq.*

[8] "Πορφυροειδέα δι' ἅλα."—*Euripides*. The "*πορφύρεον κῦμα,*" and "*θάνατον πορφύρεον,*" of Homer.

[9] "Me juvene, violacea purpura vigebat, cujus libra denariis centum venibat: nec multo post Tarentina. Huic successit dibapha Tyria," &c. &c.—*Cornelii Nepotis Fragmenta*, 8.

"Lana Tarentino violas imitata veneno."—*Hor. Ep.* lib. ii. 1.

"Te bis Afro
Murice tinctæ
Vestiunt lanæ."[10]

After this, the Amethystine colour (the first of the three) was mixed with the Tyrian Purple (the second named), which made the Tyriamethistus. The third; the Conchylia, or Buccinum Violet, was then united to the Tyrian dye (the second Purple). To this succeeded other mixtures, dye upon dye, until the vegetable colours were resorted to for additional splendour and variety, and Kermes Reds were plunged in the Tyrian crimson.[11] To make a dye from Purples they also mingled several kinds of fish, adding, at one period, nitre, urine, water salt, and Fucus (a Cretan plant, described in another page). But the dye from the Buccinum required only pure water.[12]

Purple stuffs were sacred from the remotest antiquity. Moses employed them for the vestments of the High Priests, and for the Ornaments of the Tabernacle. (Exodus xxv. 4; xxvi. 1, sqq.) They were twice dyed, and their value was equal to gold itself. The idols of Babylon had coverings of purple. The hero-princes of Homer were clothed with them. The colour was revered by all nations.[13] It at once announced the dignity of the wearer.[14]

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[10] Carm. ii. 16. &c.—Epod. lib. xii. 21; lib. ii. 2; and lib. ii. 18.

[11] "Non est satis abstulisse gemmæ nomen amethystum: rursum absolutum inebriatur Tyrio,—et cum confecere conchylia, transire melius in Tyrium putant....Color alius operiretur aliis. Quin et terrena miscere, coccoque tinctum Tyrio tingere, ut fieret Hysginum." —*Pliny,* ix. 41. Thus it would seem that the colour of Hysginum is a compound of Coccus and Purpura—scarlet and dark crimson purple. For an account of the discrepancies of the old naturalist in his descriptions of the various sources of purple dyes, see *Fabius Columna* De Purpura.

[12] Pliny, as above.—Also History of the Manners and Customs of the Ancient Greeks, by *J. A. St. John.*

[13] "Venerandam purpuram;" and again, "Sacram purpuram adoraturus accedat;"—*Cassiodorus*, xi. 20; and xi. 31.

[14] Id. i. 2.

Κήρυξ.[1] *Buccinum.*[2] TRUMPET FISH.

This shell-fish was smaller than the "Purple" shell-fish, and produced a brighter dye. The dyes of these two fishes united to make the celebrated Tyrian Purple. "The cloth or stuff is first immersed in the liquor extracted from the Purples, whilst it is green and non-perfected; it is thence taken and dipped in the dye or liquor of the Trumpet Fish." "The finest colour resembles clotted blood, and appears dark when looked at *directly*, but on looking *aslant* through the projecting filaments of the fabric, it assumes a brilliant and rich appearance."[3] "The dye of the Trumpet Fish was of little use alone, as its colour was very evanescent; but when it was joined to that of the Purples, it became fixed, whilst it effected the desired colour by adding intensity and brilliancy to the darker dye, with which it became associated."[4] This shell-fish[5] was found attached to rocks and stones.

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[1] Aristotle, Hist. v. 10.

[2] Pliny.

[3] "At Tyrius pelagio primum satiatur, immatura viridique cortinæ: mox permutatur in buccino. Laus ei summa, in colore sanguinis concreti, nigricans aspectu, idemque suspectu refulgens."—*Pliny*, ix. 38.

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[4] "Buccinum per se damnatur, quoniam fucum remittit. Pelagio admodum alligatur, nimiæque ejus nigritiæ dat austeritatem illam nitoremque, qui quæritur, cocci."—*Ibid.*

[5] "Κήρυκες πορφύραι."—*Aristot.*

'Ερυθρόδανον.[1] *Rubiæ Radix.* MADDER ROOT.

This beautiful crimson dye is extracted from the roots of the Madder plant, and, with Hysginum, another plant which supplied a red liquor, is deposited upon Chalk.[2] It is called Purpurissum, and is esteemed superior to the Tyrian, Gætulan, and Laconian Purple, on account of the stuffs being more thoroughly impregnated with the colour from the absorbent property imparted to them by the Hysginum.[3] Madder was employed for the red dye of the mummy-cloths, and was extensively used by the ancients.[4] M. Chaptal found a quantity of pale Rose-coloured pigmental matter at Pompeii, which he concluded to be Madder fixed on Alumina.[5]

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[1] "'Η ἐρευθόδανον, ἔνιοι δὲ τεύθριον καλοῦσι."—*Dioscorides,* iii. 160; *Galen,* 6; *Simplic. Pharm.*

[2] "Fiunt etiam purpurei colores, infecta creta, Rubiæ radice et Hysgino," &c.—*Vitr.* vii. 14. "The ancients knew not the distinction between aluminous and calcareous earths; all fine white earthy powders were called *Creta.*"—Sir Humphry Davy, *On Colours.*

[3] "Purpurissum, a creta argentaria cum purpuris pariter tingitur, bibitque eam colorem celerius lanis.—Quare Puteolanum potius laudatur quam Tyrium, aut Gætulicum, aut Laconicum, unde pretiosissimæ purpuræ: causa est quod Hysgino maxime inficitur, rubiamque cogitur subere."—*Pliny,* xxxv. 6.

[4] Edit. Egyptian Antiquities, British Museum.

[5] Annales de Chimie, &c.; see also, Davy, in article "Κόκκος."

Κόκκος.[1] *Coccus.*[2] SCARLET.

Coccus cacti (Linn.) ; Cochineal. An insect found on the leaves of a species of cactus, which yields a brilliant Red colour. Sir Humphrey Davy found some pigmental matter of a pale Rose-colour (on an aluminous base) in the Baths of Titus; and states that this ancient Lake agrees with that of Cochineal in becoming deeper by the application of weak alkalis, and brighter by weak acids, as well as in being destroyed by chlorine; he thinks that M. Chaptal's Lake found at Pompeii was also of the same description.[3]

Coccus ilicis (Linn.) ;[4] Kermes. Small nuts or berries, the size of Junipers, from the Ilex, or Holm Oak (*πρῖνος*) [5] excrescences produced by little worms) afforded a bright Red colour, well known to antiquity; it was, however, fugitive, and little esteemed. It came from Galatia[6] and Armenia; Asia, Cilicia, and Spain. It was produced on the Oaks in Cilicia.[7]

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[1] Theophrastus.—" Κόκκος βαφικὴ."—*Dioscor*. iv. 48.

[2] Pliny.

[3] Colours of the Ancients.

"The finest crimson and scarlet dyes are made from cochineal, according as the mordant is alumina or tin.—*Dr. Turner*.

[4] " Kermes is a dye-stuff, similar in its origin and properties to Cochineal, but inferior in beauty of tint. It is derived from Coccus ilicis."—*Id*.

[5] " *Φέρει δὲ καὶ παρὰ τὴν βάλανον κόκκον τινὰ φοινικοῦν.*"—*Theophr. Hist. Plant*. iii. 16.

[6] " Coccum Galatiæ rubens granum."—*Pliny*, ix. 41.

[7] " *Γίνεται δὲ ἡ ἐν Κιλικίᾳ ἐν ταῖς δρυσὶν ὁμοίως κοχλίᾳ μικρῷ*," &c.—*Dioscor*. iv. 48.

Ὕσγινον. *Hysginum.*[1]

Some have attempted to identify this plant with the Hyacinth (Ὑακίνθινον); some with Vaccinium; others with Glastum (Woad); and lastly with the sea weed or plant, Fucus, (Fucus marinus, Πόντιον Φύκος). Its colour was Red (Purpura), and it was employed as a ground in the stuffs, to prepare them for the better absorption and retention of the Tyrian or Madder Crimsons, with which they were afterwards completed. "Hysgino maxime inficitur, rubiamque cogitur sorbere."[2]

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[1] Vitr. Pliny.

[2] Pliny, xxxv. 6. According to Pliny (ix. 41), the colour of Hysginum is between purple and coccos. See note on Pliny in article *Πορφύρα*; also Salmasius, 272. 6.

Viola.[1] VIOLET.

A Violet colour is made in imitation of Azure. "They make an infusion of dried Violets in water, and express the juice through a linen cloth upon Eretrian Chalk."[2] They also made a Violet or modern Purple, by a transparent or overlaying process in water-colour. "They lay a blue ground, and draw over it the Madder Red (Purpurissum) mixed with white of egg."[3]

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[1] Pliny.—"Violaceo colore."—*Vitr*. vii. 14.

[2] "Viola arida decocta in aqua, succoque per linteum expresso in cretam Eretriam."—*Pliny*. xxxiii. 13.

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[3] "Si purpuram facere malunt, cæruleum sublinunt, mox purpurissum ex ovo inducunt."—*Pliny*, xxxv. 6.

The ancient purple had a very broad signification: its varieties extended from the brightest scarlet (κόκκος), through every shade of crimson down to the deepest violet, the purple of modern times. Horace means our modern purple when he speaks of the dye of Tarentum.—"Lana Tarentino *violas* imitata veneno." See also Cornelius Nepos, in article on the Tyrian Dye—*Πορφύρα*.

Πόντιον Φύκος.[1] *Fucus marinus.*[2]

A plant (or weed) called Fucus, from the rocks of Crete,[3] furnished another vegetable Red; with this dye the ground or first tint was given to those stuffs which were to be completed with the costly Purple. "Of this plant there are three kinds, the first is broad leaved; the second longer, and reddish in colour; the third has crisped leaves, which the Cretans use in dying garments. The colour is so binding that it cannot be washed out."[4]

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[1] Theophrast. Hist. Plant. iv. 6. "*Φύκος θαλάσσιον.*"—*Diosc.* iv. 100.

[2] Pliny, xxvi. 10.

[3] Mr. Hendrie considers this plant to be the ancient Hysginum. —See his *Theophilus*, p. 60. London, 1847.

[4] "Laudatissimum quæ in Creta insula juxta terram in petris nascitur, tingendis etiam lanis ita colorem alligans, ut elui non possit." —*Pliny*, xxxii. 6.

"Phycos thalassion, id est fucus marinus, lactucæ similis, qui conchyliis substernitur. Tria autem genera ejus; latum, et alterum longius, quadamtenus rubens; tertium crispis foliis, quo in Creta vestes tingunt."—*Pliny*, xxvi. 10.

Brezil Wood.—The Red dye of Brezil Wood was in use even in the time of Moses.—See *Hendrie's Theophilus*, p. 62.

Other Vegetable Colours were also made from flowers. "Non minus et ex floribus alii colores."—*Vitruvius*, vii. 14.

"Τὸ δὲ πόντιον φύκος, ὃ οἱ σπογγεῖς ἀνακολυμβῶσι, πελάγιον, καὶ ἐν Κρήτῃ δὲ φύεται πρὸς τῇ γῇ ἐπὶ τῶν πετρῶν πλεῖστον καὶ κάλλιστον, ᾧ βάπτουσιν οὐ μόνον τὰς τιμνιας, ἀλλὰ καὶ ἔρια καὶ ἱμάτια· καὶ ἕως ἂν ᾖ πρόσφατος ἡ βαφὴ, πολὺ καλλίων ἡ χρόα τῆς πορφύρας."—*Theophr. Hist. Plant.* lib. iv. c. 6.

BLUES.

Ἴσατις.[1] *Glastum.*[2] WOAD.[3]

"All the Britons stain themselves with Woad, which produces a blue colour."[4] "With the plant which the French call Glastum, the wives and maidens of the Britons completely stain their bodies; and, on certain festal days, they go naked to the temples."[5]

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[1] Dioscorides. Theophr.

[2] Pliny.

[3] Isatis tinctoria.—'Ισατις ἥμερος, ᾗ οἱ βαφεῖς χρῶνται."—*Dioscor*. ii. 215.

"Omnes se Britanni luteo inficiunt, quod et cæruleum efficit colorem."—*Cæsar*, *de Bello Gallico*, v. 14.

[5] "Simile plantagini *glastum* in Gallia vocatum, quo Britannorum conjuges nurusque toto corpora oblitæ, quibusdam in sacris et nuda incedunt, Æthiopum colorem imitantes."—*Pliny*, xxii. 1.

"The Ethiopians had half their bodies painted with Gypsum, the other half with Vermilion."—*Edit. Egypt. Antiq.*

Dr. Turner, in his Chemistry, (by Liebig and Gregory,) speaks of a *Woad Yellow*, or Luteolum—Reseda luteola.

Σάπφειρος.[1] Ultramarine (Native).

Lapis Lazuli (*hod.*) The female Cyanus of Theophrastus, which is brighter than the male. Its colour is proof against fire. The native Cyanus of Theophrastus consists of two kinds, male and female.[2] Beckmann says he can affirm, with certainty, that Lapis Lazuli was the Sapphire of the ancients.[3]

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[1] "*Σάπφειρος λίθος.*"—*Dioscorides, Theophrastus, Galen.*

[2] "Καλεῖται δὲ καὶ κύανος ὁ μὲν ἄῤῥην ὁ δὲ θῆλυς· μελάντερος δὲ ὁ ἄῤῥην."—*Theophrastus*, π.λ.; *Pliny*, xxxvii. 9; *Galen*, 9.

[3] History of Inventions, vol. ii., p. 322.

Κύανος.[1] *Cœruleum.*[2]

"Κύανος αὐτοφυής." The male Κύανος (or Cyanus) of Theophrastus, which is darker than the female.[3] Its colour is destroyed by fire. It is a native blue Carbonate of Copper. Dioscorides describes *κύανον* as coming from the copper mines.[4] He also mentions a lighter Blue of this kind, which he calls Armenion (Αρμένιον), friable, smooth, and free from grit;[5] a colour, says Aetius, which painters employ.[6] Being paler in colour, some have supposed it to be Lapis Lazuli[7] (Σάπφειρος). Theophrastus has four kinds of Blue paint.[8] Pliny also records four kinds of Cœruleum from Scythia and one from Cyprus; a light, a dark, a fine, and a coarse Azure, but he prefers the colour of Cyprus.[9]

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[1] Theophrastus. Dioscorides. Galen.

[2] Pliny.

[3] Theophrastus, see note on Σάπφειρος.

[4] "Κύανος δὲ γενάται μὲν ἐν Κύπρῳ ἐκ τῶν χαλκουργῶν μετάλλων."—v. 106.

[5] "'Αρμενίον δὲ προκριτέον τὸ λεῖον καὶ τὸ χρῶμα κυάνεον τε ἄγαν καὶ ἄλιθον, εὐθρυβές."—v. 105.

[6] "'Αρμενίακον, ῳ οἱ ζωγράφοι χρῶνται."—*Aetion, 2, ex MS.*

Cyanus.—Pliny mentions a colour from a flower (Bluebottle) called Cyanus:—"In nomine et Cyani colos."—xxi. 8.

[7] "Affinitatem esse inter Armenium cæruleumque maximam, atque eodem Lazuli lapidis nomine ab Arabibus appellari, auctor est Fallopius, iv. 33." *Harduinus*, in Pliny. "Distat a cæruleo candore modico, qui teneriorem efficit colorem."—*Pliny*, xxxv. 6.

[8] "*Φασὶ δὲ οἱ τὰ φάρμακα τρίβοντες τὸν μὲν κύανον ἐξ ἑαυτοῦ ποιεῖν χρώματα τέττερα, τὸ μὲν πρῶτον ἐκ τῶν λεπτοτάτων λεπτότατον, τὸ δὲ δεύτερον ἐκ (τῶν) παχυτάτων μελάντατον.*"—*Theophrastus*, π.λ.

[9] "Scythicum, quumque teritur, in quatuor colores mutatur, candidiorem, nigrioremque, crassiorem, tenuioremve. Præfertur huic etiamnum Cyprium," &c.—*Pliny*, xxxiii. 13.

Κύανος τεχνήτος.[1] *Cyanus Egyptius.* EGYPTIAN BLUE.

A Silicate of Copper. The artificial Cyanus of Theophrastus; said to have been invented by a king of Egypt.[2] The Cœruleum of Vitruvius.[3] The mode of

[1] Theophrastus.

[2] "*Τίς πρῶτος βασιλεὺς ἐποίησε χυτὸν κυάνον μιμησάμενος τὸν αὐτοφῦη,*" &c.—Περὶ λίθων.

That this invention by royalty was no accident, is plain from what Pliny says respecting the variety and number of their coloured glasses. "Fit et tinctura ex genere obsidiani ad escaria ursa, et totum rubens vitrum atque non translucens. Hæmatinum appellatum. Fit et album et murrhinum, hyacinthos sapphirosque imitatum, et omnibus aliis coloribus."—xxxvi. 26. See also *Theophr.* π.λ.

[3] "Arena cum natri flore conteritur," &c.—*Vitr.* vii. 11.

making this artificial Blue, which resembles the lightest kind of the Egyptian colour,[4] was brought from Egypt to Puteoli, by Vestorinus.[5] "Cœruleum, or Azure, is of three kinds:—the Egyptian (artificial); the Scythian (natural), which is inferior; the Cyprian, the best.[6]" They also make this sandy Blue in Spain, as well as at Puteoli; the latter is called by some, Cœlon.[7] This Alexandrian Blue has been found by M. Descotils upon the hieroglyphic pictures of an ancient Egyptian monument; also upon a Gallo-Roman enamel, at Brotonne.[8] It is the Blue of the Nozze Aldobrandini, according to Davy; who says also that the Cœrulea of Pliny are all factitious—preparations of blue carbonates and arseniates of Copper. "This Azure, which has endured above 1700 years, may be cheaply and easily made thus:—15 parts (weight) of Carbonate of Soda, 20 parts opaque flints, and 3 parts copper filings; strongly heat for two hours, and it will result in a fine deep sky-Blue."[9] "This Egyptian Blue, or Alexandrian frit, is a pulverized blue glass, made by vitrifying the oxides of Copper and Iron[10] with Sand and Soda."[11] "The principle of the composition of Alexandrian frit is perfect: a species of artificial Lapis Lazuli, the colouring matter inherent in hard silicious stone."[12] Girardin says that this glass Blue was found at Rome, in 1842, in the shop of a colourman, adjoining the Baths of Titus; and at Vieux, in the department of Calvados. It may be obtained, says he, by calcining for two hours, at a large heat, a mixture of 60 parts of silicious sand, 45 parts of Soda, and 9 to 10 parts of Oxide of Copper. Several kilogrammes were found in an earthen jar, at Brotonne, near Rouen, in France. There was no trace of Cobalt in it. This is evidently the same Blue colour found by Dr. Layard at Nimroud, and M. Botta at Khorsabad, in Assyria; specimens of which are now in the British Museum and the Louvre.[13]

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[4] "Fit ex Egyptii levissima parte."—*Pliny*, xxxiii. 13.

[5] Vitruvius, vii. 11.

[6] Γένη δὲ κυάνου τρία· ὁ Αἰγύπτιος, καὶ Σκύθης, καὶ τρίτος ὁ Κυπρίος," &c.—*Theophrastus*, Περὶ λίθων. Also *Pliny*, xxxiii. 13.

[7] "Idem et Puteolani usus, præterque ad fenestras: vocant cælon."—*Id.*

[8] Girardin.

[9] Davy's Works.

[10] M. Gmelin states, that the blue paint on the mummy presented to Denmark, and other objects, was produced by the vitrification of Iron. See second volume of Beckmann's *History of Inventions*. (Johnston, London,) 1817.

[11] Dr. Ure, in Wilkinson.

M. Chaptal found, in a shop at Pompeii, two blue colours, which he concluded to be Alumina and Lime with Oxide of Copper.[14]

Tritum.—"There is also an inferior Lomentum, or blue powder, called Tritum."[15]

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[12] Davy.

[13] This beautiful Silicate has been analyzed. See the note on Assyrian Colours, article Μίλτος.

[14] Davy's *Colours of the Ancients.*

[15] "Est et vilissimum genus lomenti; quidam *tritum* vocant," &c. —*Pliny*, xxxiii, 13. "Lehmann calls Lomentum our powder-blue." —*Beckmann*, ii. 337.

COBALT.

Sir Humphrey Davy found numerous pieces of bottle-glass near Naples, coloured by Cobalt; also Blue Cobalt Glass, in the Baths of Titus; and transparent Blue Glass vessels in Magna Græcia, tinged by Cobalt; as well as the same Blue Glass of Cobalt in Hadrian's Villa.[1] Dr. Marcet also states that Cobalt was employed in colouring many of the Glasses.[2] A Cobalt Glass Etruscan Vase was found near Rouen, in Normandy. A Glass Etruscan Vase, coloured by Oxide of Cobalt, was found in an ancient Roman tomb in the same district.[3] "Blue powder of Glass, mixed with white clay or chalk, in imitation of Indian Blue[4] (Indigo), coloured by Oxide of Cobalt."—*Girardin.*

[1] Davy's Works. [2] Dr. Marcet *On Coloured Glasses.*

[3] Girardin in "The Chemist."

[4] See article *'Ινδικόν.* "M. Gmelin has proved by chemical experiments, that it is possible to give to glass and enamel a blue colour by means of Iron."—Beckmann's *Hist. of Invent.*

'Ινδικόν.[1] *Indicum.*[2] INDIGO.

"The colour called Indicum is a spontaneous production, like the foam cast forth by the tide, which adheres to the Indian reeds.[3]" Being a scarce colour, it was imitated by infecting (dyeing) Selinunsian chalk, or Annu-

[1] Dioscor. Theophr. Galen. [2] Vitruv. Pliny.

[3] *"Τοῦ λεγομένου 'Ινδικόν, τὸ μὲν ἀυτομάτως γίνεται, διονεὶ, "ἔκβρασμα ὂν τῶν 'Ινδικῶν καλάμων."*—*Diosc.* v. 107.

larium, with Woad.[4] "Everything said by the ancients of Indicum seems to agree perfectly well with our Indigo."[5]

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[4] "Aut cretam Selinunsiam, vel annulariam, vitro inficiunt."—*Pliny*, xxxv. 6. See also *Vitr.* vii. 14. [5] Beckmann.

Χρυσοκόλλα.[1] *Chrysocolla.*[2] Carbonate of Copper.

A pure native green Carbonate of Copper (Davy).[3] It is sometimes found in the colour Cœruleum or Cyanus.[4] The best comes from Armenia; other qualities from Macedonia, Syria, Cyprus, and Spain.[5] It is dug in the neighbourhood of Copper mines. Pliny describes a blue copper clay made green by "luteam," a yellow herb, or dye (Weld).[6] "An artificial Chrysocolla, made from clay impregnated with Sulphate of Copper," (Davy). "Those who cannot afford Chrysocolla mix Cœruleum with Weld (yellow), and make a brilliant Green.[7]" "The Egyptian Green was a mixture of Yellow Ochre with the Vitreous Blue (Alexandrian frit), and I conjecture that the Green of the later monuments of Assyria was formed by a similar admixture of Ochre with the blue Oxide of Copper."[8] "All the Greens in the Baths of Titus, and in the Nozze Aldobrandini, were combinations of Copper." "The Carbonates of Copper, which contain an oxide and an acid, have changed very little."[9]

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[1] Theoph. Dioscor. [2] Pliny. [3] Davy.

[4] "*Καὶ κύανος αὐτοφυὴς ἔχων ἐν αὐτῷ χρυσοκόλλαν.*"—*Theophrastus, π. λ.*

[5] "*Χρυσοκόλλα δὲ διαφέρει ἡ 'Αρμενιακὴ, τῇ χρόᾳ κακακόρως πρασίζουσα· δευτερεύει δὲ ἡ Μακεδονική, εἶτα ἡ Κυπρία, καὶ ταύτης τὴν καθαρὰν προκριτέον.*"—*Diosc.* v. 104.

[6] "Luteam putant a lŭto herba dictam, quam ipsa cæruleo subtritam, pro chrysocolla inducunt, vilissimo genere atque fallacissimo."—*Pliny*, xxxiii. 5.

[7] "Qui non possunt chrysocolla propter caritatem uti, herba quæ lŭtum [yellow] appellatur, cæruleum inficiunt, et utuntur viridissimo colore."—*Vitr.* vii. 14.

Davy found a Verona-green earth near the Pyramid of Caius Cestius, in Rome; also a second colour, a pale grass-green Carbonate of Copper and Chalk; a third was Copper mixed with blue Copper frit. He also found an extremely brilliant Green in the Baths of Titus, a pure Carbonate of Copper.[10]

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[8] See Layard's *Nineveh;* and Dr. Ure, in *Wilkinson's Egyptians.*

[9] Davy.

[10] "I am fully of opinion, that the Cyanus of Theophrastus, the Cæruleum of Pliny, and the *Chrysocolla*, were the *blue* copper earth," &c. &c. ! !—*Beckmann*, vol. iii., p. 337.

Θεοδότιον.[1] *Terra Viridis.* Verona Green.

A green earth, a painter's colour; from the grounds of Theodosius, in the vicinity of Smyrna. Sir Humphrey Davy found an olive-green earth near the tomb of Caius Cestius, in Rome, which was *Verona Green*, or Terra Verde. This green earth of Theodosius was of the same character. M. Chaptal found a Verona-green earth in a shop at Pompeii.

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[1] "Creta viridis pluribus locis nascitur, sed optima Smyrnæ. Hanc autem Græce ϑεοδότιον vocant, quod Theodotus nomine fuerat, cujus in fundo id genus cretæ primus est inventum."—*Vitruvius*, vii. 7.

Πρασίτης.[2] *Prasius Lapis.*—A green earth or Jasper, inferor to Chrysocolla, or pure Carbonate of Copper. It is of an æruginous or verdigris-colour.[3] Pliny gives three kinds:—the first is all green; the second, green with red spots; the third, green with white streaks.[4]

Appianum.[5]—An inferior green earth, from Appia.[6]

Viride Alexandrinum.—Celsus mentions this green earth among the cures for wounds.[7]

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[2] Theophrastus. π. λ. [3] "*Αὕτη δὲ ιώδης τή χρόα.*"—*Id.*

[4] "Viridantium et alia plura sunt genera. Vilioris est turbæ, Prasius; cujus alterum genus sanguineis punctis abhorret; tertium est virgulis tribus distinctum candidis."—xxxvii. 8. "Prasinus virenti verno."—*Cassiodorus*, iii, 51.

[5] Pliny.

[6] "Viride quod Appianum vocatur." "Fit et ex creta viridi . . . . vilissimum."

[7] "Si ea non sint, Viride Alexandrinum," viii. 27.

Iòs.[1] *Ærugo.*[2] VERDIGRIS.

Copper, corroded by the lees of wine.[3] Vitruvius notices Verdigris, which is chiefly made in Cyprus and Rhodes, as a painter's colour; and, with Theophrastus,[4] Dioscorides,[5] and Pliny,[6] says that Ceruse or White Lead, and Verdigris, are similarly manufactured.[7] "Probably many ancient greens which are now carbonates of copper were originally laid on in the state of acetate."[8]

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[1] Theophr. Dioscor. [2] Pliny. [3] Theophrastus.

[4] *Παραπλησίως δὲ καὶ ὁ Ιὸς γίνεται.*"—*Id.*

[5] Dioscor. v, 91. [6] Pliny, xxxiv. 11.

[7] Vitr. vii. 12. [8] Sir Humphrey Davy.

Ιουδαϊκός Λίθος.[1] *Bitumen Judaicum.* ASPHALTUM.

Judaicus Lapis. The best is from Judæa,[2]—the Dead Sea.[3] "Good bitumen is known by its weight and its glossy fracture."[4] There is also a bituminous earth or mineral from Sidon.[5]

Γαγάτης. *Gagates.* is another stone [Jet] that is bituminous and inflammable, from the mouth of the River Gagis in Lycia.[6]

Θρακίας. The *Thracian Stone*, which is also found in Scythia.[7]

Αμπελίτις.—*Ampelitis* is an earth like Bitumen: when good, it will dissolve freely in oil, like wax.[8]

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[1] Dioscorides.

[2] "'Ασφάλτος διαφέρει ἡ 'Ιουδαικὴ τῆς λοιπῆς."—*Dioscor.* i. 99.

[3] "E Judææ lacu, ut diximus, emergens."—*Pliny*, xxxv. 15.

[4] "Bituminis probatio, ut quam maxime splendeat, sitque ponderosum ac grave."—*Id.*

[5] Terra in Syria, circa Sidonem oppidum maritimum."—*Id.*

[6] Τοῦ δὲ Γαγάτου προκριτέον τὸν ταχέως ἐξαπτόμενον, καὶ ἀσφαλτίζοντα τῇ ὀσμῇ."—*Dioscorides*, v. 146; *Pliny*, xxxvi. 18.
"Χροιῇ δ' αιθαλοεις," &c.—*Orpheus*, Περὶ Λίθων.—v. 470.

[7] 'Ο δὲ λεγόμενος Θρακίας, γεννάται μὲν ἐν Σκυθία, ἐν ποταμῷ τῷ λεγομένῳ Πόντῳ. Δύναται δὲ τὰ ἀυτα τῷ Γαγάτῃ."—*Dioscor.* v. 147.

[8] "Τῆς δ' 'Αμπελίτιδος γῆς, ἥν τίνες φαρμακῖτιν καλοῦσι,"&c. ....."'Ετι δὲ οὐ δὲ βραδίως τηκομένη ὅταν λεανθείσῃ ἐπι χυθῇ ποσῶς ἔλαιον."—*Dioscor.* v. 181. "Bitumini simillima est ampelitis; experimentum ejus, si ceræ modo accepto olio, liquescat," &c.—*Pliny*, xxxv. 16.

Πιττασφάλτος.[1] *Pissasphaltos.*[2] LIQUID BITUMEN.[3]

There is a liquid Bitumen from Zante, and from Babylon; also from Apollonia:[4] all which the Greeks call Pissasphalton, because of their consisting of Pitch and Bitumen.[5] There is a similar kind, resembling oil, at Agrigentum in Sicily, which they burn in lamps.[6]

[1] Dioscorides.

[2] Pliny.

[3] "Bitumen and Petroleum. Under these names are known certain natural tarry matters, more or less fluid, which have evidently resulted from the decomposition of wood or coal, either by heat, or by spontaneous action under the surface of the earth .... There are other forms of Bitumen which are dark coloured or black, and chiefly composed of solid matter, such as Asphaltum and Maltha. Their chemical history is little known."—*Turner.*

[4] "*Καλείται δὲ τίς καὶ πιττάσφαλτος γενωμένη ἐν 'Απολλωνία τῇ πρὸς 'Επιδάμνω,*" &c.—*Dioscor.* i. 100.

[5] "Est vero liquidum Bitumen, sicut Zacynthium, et quod a Babylone invehitur. Liquidum est et Apolloniaticum: quæ omnia Græci pissasphalton appellant, ex argumento picis et bituminis."—*Pliny*, xxxv. 15.

[6] "Gignitur etiam pingue liquorisque oleacei, in Sicilia Agragantino fonte inficiens rivum."—"Utuntur eo ad lucernarum lumina, olei vice," &c.—*Pliny*, xxxv. 15.

Three Brown Colours and Umber. (DAVY.)

Pliny speaks of an African Ochre called Ciculum—Cicerculus,[1] which Davy calls a Brown Ochre, and says it probably contained Manganese.

[1] "Ex Africa venit, ... cicerculum appellant."—xxxv. 6.

Sir Humphrey discovered three antique browns:—

The first was an oxide of Manganese, as well as an oxide of Iron.

The second a deep red-brown; an Ochre partially calcined. (The red-brown often occurs on the faces of the figures painted upon mummy-cases: a brown-red Oxide of Iron mixed with Lime.)

The third was a snuff-brown Ochre.

The Browns in the Baths of Livia, and in the Nozze Aldobrandini, are all Ochres, mixed with black. (Davy.)

"Brown Ochre and Umber, compounds which owe their peculiar tints to a mixture of Hydrates and Manganese, were found on the tiles discovered by M. Deville in the ancient Villa of the Forest of Brotonne."[2]

[2] Girardin.

Τρύγα.[1] *Τρύγινον.*[2] *Fæcatum.* BLUE BLACK.

Fæx Vini; Burnt Wine-lees. The better the Vine, the more the colour resembles Indian Blue (Indigo.) It was used by Polygnotus and Micon.[3]

Burnt Wood.—The ancients had a black made from burnt wood.[4]

[1] Dioscorides. [2] Pliny.

[3] Vitruvius, vii. 10. "Sunt qui et vini fæcem siccatam excoquant; affirmantque, si ex bono vino fæx fuerit, Indici speciem id atramentum præbere. Polygnotus et Micon; celeberrimi pictores Athenis, e vinaceis fecere: tryginon appellant."—*Pliny,* xxxv. 6.

[4] "Fit et e tedis ligno combusto, tritisque in mortario carbonibus."—*Id.*

Indicum.—Also a black, called Indicum, from India.[5] Beckmann thinks the latter may have been Indian Ink.[6]

[5] Apportatur et Indicum ex India," &c—*Id.*
[6] History of Inventions. 'Ινδικόν μέλαν.—*Arrian.*

Ελεφάντινον.[1] *Elephantinum.*[2] Ivory Black.

Calcined Ivory; used by Apelles.[3]

[1] Apelles, in Pliny. [2] Pliny.
[3] "Apelles commentus est ex ebore combusto facere, quod elephantinum vocavit."—*Pliny*, xxxv. 6.

Μέλαν.[1] *Atramentum.*[2] Bone Black.

The Egyptians used a Black from calcined Bones.[3] Dalechamp ~~Scaliger~~ says, that the best of the three ancient Blacks was made from the burnt bones of the Persians.[4] The Assyrians also employed a Black from burnt bones.[5]

[1] Dioscorides. [2] Pliny.
[3] Dr. Ure, in Wilkinson. "Inventi sunt pictores, qui e sepulchris carbones infectos effoderent."—*Pliny,* xxxv. 6.
[4] "Primum quidem ex fuligine olei nucum usti: deinde ex ebore cremato: tertio, quod est prestantissimum, ex *ossibus Persicorum* ustis." See his note to Pliny—xxxv. 6. (Lips. 1788.)
[5] Layard's Nineveh.

Ασβόλη.[1] *Fuligo.*[2] Lamp Black.

The smoke of burnt Rosin or Pitch.[3] The soot which the painters use is from the glassworkers, which is the

[1] Dioscor. [2] Pliny.
[3] "Atramentum fit enim et fuligine pluribus modis, resina vel pice exustis," *et seq.*—*Pliny*, xxxv. 6; and *Vitr.* vii. 10.

best.[4] All the ancient Blacks discovered by Davy were carbonaceous. He found them in the Baths of Titus and Livia; also in the Aldobrandini marriage.

[4] "'Ασβόλη ᾗ οἱ ζωγράφοι χρῶνται, λαμβάνεται μὲν ἐκ τῶν ὑελουργῶν· διαφέρει γὰρ ἅυτη."—*Diosc.* v. 182.

Manganese Black.

The black Oxide of Manganese was found by Davy in two specimens of purple Roman glass. It is not improbable that the ancients used Manganese for painting their pottery.

Count Caylus, Gensanne, and others, positively assert that the Etruscan vases and lamps were painted with the same kind of Manganese that we now use for our earthenware.[1]

Μελαντηρία. A mineral Black, or Atramentum—an earthy substance found at the mouths of Copper mines—is recorded by Dioscorides, v. 118.

Στίμμι.[2] Stibium, Black Antimony. The native Sulphuret of Antimony was employed by the Egyptians in many of their works of art. The women of Assyria and Egypt blackened their eyebrows and eyelids with this pigment, which expanded the eyes and added to their beauty.

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[1] Recueil des Antiquités, i. p. 86. Traité de la fonte des Mines. Paris, 1770, &c.

[2] "Stimmi, appellant alii Stibium, alii Alabastrum, alii Larbason. Duo ejus genera, mas et fœmina. Magis probant fœminam," &c. Namque ideo etiam plerique platyopthalmon id appellavere, quoniam in calliblepharis mulierum dilatet oculos."—*Pliny*, xxxiii. 6. See also Dioscorides, v. 99. "*Καὶ τὴν μέλαιναν στίμμιν ὀμματογράφον.*"—*Ιον*, in Pollux.

MATERIALS AVAILABLE FOR VEHICLES AND VARNISHES, WHICH WERE KNOWN TO THE ANCIENTS.

DRYING OILS.

Pitch is drawn out and melted in *Oil.*[1]
Wax mixed and tempered with *Oil.*[2]
Punic wax liquefied with *Oil.*[3]
All Resins are soluble in *Oil.*

[1] "Concordia valent, pix *oleo* extrahitur quando utrumque pinguis naturæ est."—*Pliny*, xxiv. 1.

[2] "Ceram punicam paulo *oleo* temperatam."—*Vitruvius*, vii. 9.

[3] "Cera punica cum *oleo* liquefacta."—*Pliny*, xxxiii. 7.

Καρυΐνον.[1] *Caryinum.* WALNUT OIL.

The oil which is made from walnuts is called Caryinum.[1]

[1] "*Καὶ τὸ καρυΐνον ἐκ τῶν βασιλικῶν καρύων συντιθέμενον.*"—*Dioscorides*, i. 41.

"*Ἔλαιον γοῦν ἔκθλῖψαι δυνατὸν ἐστιν ἐξ αὐτοῦ παλαιουμένου.*" —Galen, *De Simpl. Med.* vii. 12.

"E nuce vero juglandi," &c.—*Pliny*, xxiii. 4.—"E nucibus juglandibus quod Caryinon vocant."—*Id.* xv. 7.

Μήκωνον. *Papavereum.* POPPY OIL.

Being placed in the sun, it liquefies; and, when put to a lamp, burns brightly.[2]

[2] "*Καὶ πρὸς λύχνον ἐξαπτόμενος οὐ ζοφώδει φλογί.*"—*Dioscor.* iv. 65; *Pliny*, xx. 18.

Κίκινον.[3] *Cicinum.* CASTOR OIL.

Ricinus or Croto—Palma Christi; a herb which grows abundantly in Egypt.

Linseed[4] and *Hempseed*[5] *Oils* were expressed by the Ancients.—(*Diosc.*, *Galen*, *Pliny*, &c.)

Euphorbum.—(*Diosc.* and *Pliny*). *Cucurbita.*—(*Diosc.*). They all yield drying oils.—*Dr. Turner.*

[3] Galen. "Κικίνον ἔλαιον."—*Diosc.* i. 38. "*Κίκι ἢ κρότων, οἱ δὲ σήσαμον ἄγριον, οἱ δὲ σέσελι Κύπριον, οἱ δὲ κροτῶνα.*"—*Id.* i. 164.

"Proximum fit e cici, arbore in Egypto copiosa."—*Pliny*, xv. 7; also Trixis, or wild Sesame.—"Οἱ *δὲ τρίξιν.*"

Sir C. L. Eastlake (*Materials*, *&c.*, p. 19) quoting the Mappæ Claviculæ, says that "This oil was used as a varnish by the painters of the twelfth century;" and Brande calls it a drying oil. It is, however, the opinion of many, that this oil has no drying property whatever.

[4] "*Λίνου σπέρμα κεκομμένον,*" &c.—*Thucyd.* lib. 4.

[5] "Χλωρὸς *δὲ χυλίσθεις.*"—*Diosc.* iii. 165.

ESSENTIAL OILS.

Πισσέλαιον.[1] *Picinum Oleum.*[2] OIL OF TURPENTINE.

The essential Oil called Picinum consists of the steam or vapour of boiled Pitch, caught on wool-fleeces spread over the cauldron, and afterwards squeezed out of them. The best is made from the Calabrian (Bruttian) pitch, as it is the richest and most resinous.[3]

[1] Dioscorides. [2] Pliny.

[3] "*Καὶ ἐκ λαμβάνεται δὲ ἐν τῇ ἑψήσει τῆς πίσσης, ὑπεραιωρουμένου ἐρίου καθαροῦ, ὅπερ ὅταν ἐκ τοῦ ἀναφερομένου ἀτμοῦ γένηται διάβροχον, ἐκθλίβεται ἐις ἀγγειον.*"—*Diosc.* i. 95.

"E pice fit, quod pissinum appellant quum coquitur, velleribus supra halitum ejus expansis, atque ita expressis; probatum maxime ex Brutia; est enim pinguissima et resinorissima. Color oleo fulvus."—*Pliny*, xv. 7.

For a more scientific evidence of Greek skill in distillation, or rather sublimation, see note to the article on Cinnabar.

Κεδρέλαιον. *Pisselæon.*[1] OIL OF CEDAR.

Oil is also produced from the Cedar tree. They call it Pisselæon, (Cedrelæon).

It is separated from the Cedar whilst the latter is being heated, woollen flocks being spread above to catch the exhalations, which are afterwards expressed from the wool.[2]

[1] "Fit ex eo et oleum, quod pisselæon vocant."—*Pliny*, xxiv. 5.

[2] "Γίνεται δὲ καὶ ἔλαιον, ἐξ αὐτῆς, χωριζόμενον ἀπο τῆς κεδρίας δι' ἐρίου ὑπεραιωρουμένου ἐν τῇ ἑψήτει ὡς ἰπὶ τῆς πίσσης,"—*Dioscor.* i. 105.

Νάφθα.[1] *Naphtha.* NAPHTHA.

A white oily bitumen which flows from the Babylonian Asphalte. It is used in lamps also.[2]

[1] "Καλεῖται δὲ τίς καὶ νάφθα, ὅσπερ ἐστι τῆς Βαβυλωνίου ἀσφάλτου περιήθημα, τῷ χρώματι λευκόν."—*Dioscor.* i. 101.

[2] "Prima densatio Babylone in bitumen liquidum cogitur, oleo simile, quo et in lucernis utuntur."—*Pliny*, xxxi. 7. Also Galen. "Πετρέλαιον."—*Nic. Alexandr.*

DRYERS.

Λιθάργυρος.[1] *Molybditis.*[2] LITHARGE.

The red Protoxide of Lead, or vitreous Oxide; made from Lead-ore, calcined. It is called Puteolana, from having been manufactured at that place. Davy found it in the Baths of Titus.

[1] "Λιθάργυρος ἡ μὲν τίς ἐκ τῆς μολιβδίτιδος καλουμένης ἄμμου γεννᾶται, χωνευομένης ἄχρι τελείας ἐκπυρώσεως· ἡ δὲ ἐξ ἀργύρου· ἡ δὲ ἐκ μολίβδου."—*Diosc.* v. 102.

[2] "Molybditis plumbi ipsius fusura, quæ fit Puteolis, et inde habet nomen."—*Pliny*, xxxiii. 6.

"Λιθάργυρος ξηραίνει."—Galen, *De Simp. Med.* 9. 3. 17.

Ψιμμίθιον. *Cerussa.* WHITE LEAD.

Carbonate of Lead. "White Lead and Litharge thicken and dry."[1]

[1] "*Ψιμμίθιον γοῦν καὶ λιθάργυρος στύφει καὶ ξηραίνει.*"—Galen, *De Meth. Med.* iii. 4.

RESINS.

"Resina omnis dissolvitur olio."—*Pliny*, xiv. 20.

Τέρμινθος.[1] *Terebinthus.*[2] TURPENTINE RESIN.

The best and clearest Turpentine Resin comes from the East.[2]

[1] Theophrastus, "*Ψύχει δὲ καὶ στύφει.*"—*Diosc.* i. 50.

[2] "In Oriente optimam tenuissimamque Terebinthi fundunt.—*Pliny*, xiv. 20.

"*Προάγει δὲ πασῶν τῶν ῥητινῶν ἡ τερμινθίνη.*"—*Diosc.* i. 91.

Μαστίχη.[1] *Lentescina.* MASTIC RESIN.

The next Resin in quality is the Mastic.[2] The best is the white Mastic of Chio.[3]

[1] "*Μαστίχη ἡ μὲν λεύκη καὶ χία.*"—Galen, *De Simp. Med.* lib. 7. p. 206.

[2] "Proxima ex lentisco."—*Pliny*, lib. xvi. 22 §; also xxiv. 6; also *Diosc.* i. 91.

[3] "*Συντίθεται δὲ ἐν Χίῳ τῇ νήσῳ κάλλιστον.*—*Diosc.* i. 51.

Λίβανος.[1] *Thus.* FRANKINCENSE.

Lebanon comes from Arabia; it should be white, large, brittle, and inflammable, and should resist the toothbite.[2]

[1] "*Λίβανος γενᾶται μὲν ἐν Ἀραβίᾳ τῇ Λιβαναφόρῳ καλουμένῃ,*" &c.—*Diosc.* i. 81.

[2] "Probatur candore, amplitudine, fragilitate, carbone ut statim ardeat. Item ne dentem accipeat potius quam in micas friet."—*Pliny*, xii. 14. "*Λιβανωτὸν.*"—*Theophr. Hist.* ix. 4.

Πίσσα ξηρὰ. *Pix sicca.* DRY PITCH.

Its goodness is tested by its purity, its clearness, its fatness, its good odour, its brightness, and its resinous quality.[1]

[1] "῞Εστι δὲ καλὴ ἡ καθαρὰ καὶ λιπαρὰ, εὐώδης τὲ καὶ ὑπόκιῤῥος καὶ ῥητινώδης."—*Diosc.* i. 97.

῎Ηλεκτρον. *Succinum.* AMBER.

"To attract like Amber."[1] "Called by some Electron."[2] "A kind of glass found on the shore; burns brightly, is very imponderous, and is believed by our ancestors to come from the pine-trees."[3]

[1] "Τὰ δὲ καὶ ἕλκειν, ὥσπερ ἡ λίθος καὶ τὸ ἤλεκτρον."—*Theophr. Hist. Plant.* ix. 18.

[2] "῎Εστι γὰρ τὸν καλοὺμενον ὑπ' ἐνίων ἤλεκτρον πτερυγόφορον." [*succinum.*] *Diosc.* ii. 100. "Λυγγούριον."—*Id.*

[3] "Bitumen concretum." "Modo croceo colore rubens, modo flammea claritate pinguiscens," &c. "Hanc levissimam substantiam." —*Cassiod.* v. 1.

[4] "Arboris succum esse prisci nostri credidere, ob id succinum appellantes."—*Pliny*, xxxvii. 3.

"Sed et mare scrutantur, ac soli omnium succinum, quod ipsi Glassum vocant, inter vada, atque in ipso littore legunt."—Tacitus, *De moribus Germ.* See also Virgil, 8th Æneid; Homer, Od. *δ* and *ο*. "*Χρύσεον ὅρμον ἔχων, μετὰ δ' ἠλέκτροισιν ἔερτο.*"—A gold necklace ornamented with *amber* beads.

LIQUID RESINS AND BITUMENS.

Πεύκη. *Larix.* LARCH RESIN.

This Resin, which is honey-coloured, issues slowly from the Larch tree, but never becomes hard.[1]

[1] "Plusculum huic erumpit liquoris, malleo colore, atque lentiore, nunquam durescentis."—*Pliny*, xvi. 10.

Πίσσα ὑγρὰ. *Pix liquida.* Liquid Pitch.

It should be pure, brilliant, light, and clear.[1]

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[1] "Ἔστι δὲ καλὴ ἡ στίλβουσα καὶ λεία καὶ καθαρά."—*Diosc.* i. 94.

Μέλαν. *Atramentum.* Liquid Bitumen.

A dark varnish, used by Apelles; a liquid Bitumen, which was applied so thinly over the picture, when finished, that it brought out the colours in all their brilliancy, and preserved them from dust and dirt.[1] "Many painted woods, such as the outer sarcophagi, are covered with a very bright varnish, which proved to be a resinous substance, probably dissolved in essential Oil of Turpentine."[2]—*Egypt. Antiq.*

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[1] "Quod absoluta opera atramento illinebat ita tenui ut idipsum repercussa claritates colorum excitaret, custodietque a pulvere et sordibus."—*Pliny,* xxxv. 10.

There are liquid resins also both from the pine and pitch-tree; these are brought from France and Etruria. They vary in colour; as some are like oil, others white, and some like honey, as the larch. There is also a resinous liquid from the cypress. See Dioscorides, i. 92.

[2] Edit. Egypt. Antiq. Colonel Rawlinson found a coating of siliceous varnish over the sculptured inscriptions at Behistun, which was infinitely harder than the limestone itself, on which the letters were carved. This is probably the oldest, as well as most durable varnish ever known!

Κηρός. *Cera.* Wax.

The colours prepared for the ship encaustic painter were ground and mixed with melted wax, to be ready for the artist's use. These masses or cakes of colour were called simply "Waxes," as the colours of the present day, which are ground in oil, are called "Oils." The "waxes" had these advantages over our "oils:" they were more portable, and not subject to rancidity, fattening, and other disagreeable changes peculiar to the modern diluent. When the "waxes" were required for use they were redissolved at the fire, and laid on with the brush,—"resolutis igni ceris penicillo utendi."[1] The picture being completed, a salamander or cauterium, or brazier of hot charcoal, was applied at a little distance, which again dissolved the wax, and spread it like a varnish or enamel over the whole surface. This heating of the picture was called "encaustica." The surface was then rubbed and polished with linen cloths and wax, which enabled it to defy the sun, the winds, and the salt water; sun, wave, and storm,—"Quæ pictura in navibus nec sole nec sale ventisque corrumpitur."[2] This is all that Pliny has told us of the most brilliant and durable process of painting adopted by the ancients.

So important a material was wax considered by the Greeks, as the chief protector of their works of art, that the word "wax" was frequently introduced to denote the picture itself; thus Anacreon, "*Τάχα, κηρὲ, καὶ λαλήσεις*,"—"Quickly, O Wax, thou wilt speak!" so forcible was the portraiture of the individual represented; and

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[1] "Wax, when bleached, melts at 158° (Fahren.), and congeals at 149°."—*Turner.*

"Wax is sparingly soluble in boiling alcohol and ether. The acids scarcely act upon it. Cold ether has no action upon it. Hot oils, both volatile and fixed, readily dissolve it."—*Brande.*

[2] Pliny, xxxv. 11.

Statius, "Apelleæ cuperent te describere ceræ,"[4]—"The 'waxes' of Apelles are desirous to delineate thee." Ovid speaks of "waxed ships,"—"ceratæ puppes,"—in the same spirit, though we know from Dioscorides that the "tarring" substance, "Ζωπισσα," contained resin also,—"ῥητίνην μετὰ τȍυ κηροῦ."[5]

As the curt recipe of Pliny, above quoted, was expressly directed to the encaustic pictures intended for the garniture of ships, we are not bound to conclude that those painters who produced accomplished works of art in encaustic (unconnected with ships), confined themselves to struggling in hot waxes without diluents,[6] even if Pliny's statement be taken as the whole truth respecting ship pictures; for Apelles had his own varnish (atramentum), or *glazing* vehicle, (Reynolds); and Pamphilus is said to have painted in various modes.[7]

In order to ensure the encaustic gloss or varnish, to a picture, it is not necessary to employ more than an eighth or a tenth portion of wax in the vehicle or diluent with which the artist works, even though the colours themselves should have been previously ground or mixed with oil, or any other available transparent medium. "It," says Sir Charles Eastlake, "was the chief ingredient, *not necessarily in regard to quantity*, but inasmuch as it was indispensable to the fusion of the surface in the final inustion."[8] Such being the fact, we may reasonably suppose that the sagacious Greek would employ no more of this difficult material than was necessary for the protection of his work, the only object for which he could possibly introduce it. Now the means he had of rendering the wax fluid are well known to us. Vitruvius tells us that wax was dissolved or tempered by oil, "oleo temperata." Pliny also has his "wax melted in oil,"—"Cera punica cum oleo liquefacta." Dioscorides has his "resin mixed with wax," (see above); also his "wax mixed with essential oil, Naptha,—Νάπθα καὶ κηρῷ;" and to crown all, Pliny has given the Attic bee sufficient intelligence to contrive an union of its wax with liquid resin to varnish its hive, as a protection against the elements; for even this little insect (wiser than some critics and commentators) knew that it was not necessary to employ the wax *exclusively*, in order to secure an enduring hydrofuge.

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[4] Anacreon, Od., also—

"Τὸ δὲ πᾶν, ὁ κηρὸς αὐτὸς
'Εχέτω λαλῶν σιωπῇ."

[5] i. 103.

[6] Diosc. i. 98; also Pliny, xvi. 12.

[7] Pliny, xxxv. 9.

[8] Materials, &c., p. 156

Is it not probable that the old naturalist merely intended his statement as a hasty and incomplete sketch of the pictorial process, leaving to others better acquainted with the usages of the atelier, to detail the varied vehicles employed by the artists? If such a "chronicler of all things" as Pliny, were to arise in the present day, he would doubtless designate the ordinary artistic practice,—"painting in 'Oils,'" without troubling himself about the Solutions of Hard Resins, Balsams or Soft Resins, Essential Oils, Drying Oils, and Boiled Oils, Magilps and Gumtions, now in vogue, and consider that he had effectually fulfilled his task; whilst his imperfect statement, if the lapse of another nineteen centuries should sweep away all other records, would run the same risk of being quoted as an incontrovertible proof that the Europeans of former ages employed no other vehicles than *mere oil* with their colours.

With respect to the knowledge of the ancient Greeks respecting Oils, Vehicles, and Varnishes, and the use they made of them, the opinions of a few eminent writers may not be unacceptable:—

Pamphilus was a painter of science and acquirements ("omnibus literis eruditus,"—*Pliny*): he discovered several modes of painting; and, says Mr. Hendrie, "it might fairly be inquired whether oil was unknown to Pamphilus."[9] "It is generally said, that the art of mixing colours with oils was not known to the Greek artists, but it is very unlikely that they should never have tried such a mode of fixing colours."[10] "Oil-varnish," says Raspe, "could not possibly be a secret to the Greek artists. Apelles' Varnish resembled it. I would ask the artists, chemists, and connoisseurs, whether they know of any liquid substance or mixture fit to produce these effects besides the Varnishes? If there are not, as to my knowledge seems to be the case, Apelles and the Greeks were undoubtedly acquainted with oil-varnishes; a fact which cannot be questioned, and which might be strongly urged in behalf of their knowledge of oil-colours."[11]

Sir Joshua Reynolds, without any allusion to the materials or vehicles which were at the command of the ancient Greek painters, or to the graphic notices of their results, on the score of depth and transparency, as recorded by Aristotle;[12] but simply from the impression made upon his mind by Pliny's description of the effect produced on a picture by the application of the Atramentum or Varnish of Apelles,—"Quod absoluta opera atramento illinebat ita tenui, ut id ipsum repercussu claritates colorum excitaret; et cum ratione magna, ne colorum claritas oculorum aciem offenderet;"—gives his judgment respecting the artistic practice of that period in these words: "This passage, though it may probably perplex the critics, is a true and artist-like description of the effect of glazing or scumbling, such as was practised by Titian, and the rest of the Venetian painters." "This custom, or mode of operation, implies at least a true taste of that in which the excellence of colouring consists; which does not proceed from fine colours, but true colours; from breaking down those fine colours which would appear too new, to a deep-toned brightness. Perhaps the manner in which Correggio practised the art of glazing was still more like that of Apelles, which was only perceptible to those who looked close to the picture,—"ad manum intuenti demum apparet;" whereas in Titian, and still more in Bassano, and others his imitators, it was apparent on the slightest inspection.[13]

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[9] Hendrie's Theophilus, &c.

[10] Edit. Egypt. Ant. Brit. Mus.

[11] Critical Essay, &c. (London, 1781).

"Resins dissolved in a drying-oil had, for many centuries, been employed for varnishes," says Sir Charles Eastlake; "and it is quite conceivable that a practice which was common among the Byzantine artists, might have been derived, as many of their processes were, from the technical methods of the best ages of Greece, when varnishes of some kind were certainly in use. The well known description which Pliny has given of the effect of that employed by Apelles, is sufficient to establish the general fact." [14]

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[12] This author speaks of colours when drawn over White as being more luminous; but over Black more dingy and opaque; (De Coloribus, § 4.) of colours being made to appear through one another by glazing, as when they wish to make anything seen in water or air. Also, as the sun looks white, when seen direct; but red, when seen through clouds and smoke: (Id. de Sensu et Sensibili, § 3.) and of light being reflected from subjected colours. (Id. de Coloribus, § 3.)

[13] See Sir Joshua's Works, by Malone (Notes on Fresnoy).

"Linseed, walnut, and poppy oils," says Mr. Hendrie, "were known to Theophilus; and probably all of them to the Greek painters, as drying-oils fit to be used in painting. Linseed oil could not have remained long unknown to the Egyptians; great cultivators of flax, skilful in the arts and medicine, they could not have overlooked the production of an oil from the linseed, nor have been ignorant of its peculiar properties."—"In the British Museum are stone-sculptured figures which are Egyptian, and have been painted with an unctuous vehicle, which appears to have been oil." [15] Mr. Rich, in his "Ruins of Babylon," says: "It may be proper to add here, that the Bitumen (cement), to deprive it of its brittleness, and render it capable of being applied to the bricks, must be boiled with a certain portion of *oil*." [16]

"Juvenal says that the ancients waxed their statues, and Pliny says that white bitumen entered into composition with the Inceratura. Vitruvius states that the latter was made for encaustic; and it is understood from

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[14] Sir C. Eastlake's Materials, &c., p. 14.

[15] Hendrie's Theophilus, p. 94.

[16] Page 95 (London, 1806).

Pliny that the waxing of the statues was the proper business of the painters; thence I, without cavil, draw proofs that the painters, in the time of the Greeks, *mixed white bitumen with wax* to work encaustic."[17]

"It appears almost certain that the varnishes which have been made and employed for many centuries by the nations who inhabit the eastern parts of Asia, were in part known also to the Romans. The Ruins of Pompeia remove every doubt in regard to the use which these people made of *oil painting* to ornament their buildings. Some pieces of their copper coin, struck under the reign of Trajan, and dug up from ancient ruins, are covered, as Count Caylus remarks, with a kind of resinous varnish, similar to that which would result from a mixture of *oil and black pitch.*"

"Greece might, perhaps, still boast of masterpieces of encaustic from the hands of Polygnotus of Thasos, had they not, *after* NINE CENTURIES *of admiration*, become a subject of envy or emulation to one of the Roman Prætors, who caused them to be transported to the capital of the world, where they shared in the fate of so many other valuable monuments of antiquity."[18]

Müller, in his "Ancient Art and its Remains," has given the following version of Pliny's *third* mode of encaustic painting. "The painting of ships, (donec classes pingi cepere,—quæ pictura in navibus,) with brushes which were dipped in a kind of *fluid wax mixed with pitch,* which not merely provided their external surface with an ornament, but at the same time with a protection against the sea water." [19]

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[17] "Ultimamente io trovo in Giovenale, che le statue s'inceravano: 'Genua' (dice) 'incerare Deorum;' e in Plinio, che in questa inceratura entrava il bitume giudaico bianco. Oltre de ciò leggo in Vitruvio, che quest' inceratura si faceva all' encausto; e da Plinio si conchiude, che l'incerare le statue era proprio mesticie dei Pittori; onde io senza stiracchiare i testimonii inferisco, che i Pittori mischiassero a tempo de' Greci il bitume bianco colla cera per lavorare all' encausto."—Requeno, *Saggî sul ristabilimento dell' antica Arte, &c. &c.*, i. 273. (Parma, 1787).

[18] Professor Tingry's *Treatise on Varnishes,* Prefat.

Even if the probability be admitted of the Greeks having had the *sagacity* to discover that the drying-oils were susceptible of mixture with painters' colours, it would be difficult to say whether they might have considered themselves gainers by the invention. Montabert says: "If it had been proposed to Apelles to try Van Eyck's process of painting in "oils," *it would only have excited his pity,*" *! ! !* [20] and as the Greeks ever showed an anxiety about the durability of their productions, it is not improbable that they had sufficient acumen to discover that the *facile fluid* had little of a perennial character about it. "Oil," says Requeno, "although purified, becomes rancid in pictures, without doubt, in the course of a few years, and sensibly changes our best colours." [21]

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[19] London: translated from the German, by Leitch, 1847, p. 320.

[20] "Si l'on eût proposé à Apelle d'essayer les procédés de Van Eyck, Apelle eût souri de pitie."—*Traité complète de Peinture.* (Paris, 1829).

In a paper on Tannin, in the 6th Report of the Fine Arts Commission, the writer says, "Few things are so destructive to canvas as oil."

[21] "L'olio, ancorche purgatissimo, devien rancido senza dubbio ne' quadri col decorso di pochi anni, e fa cangiare sensibilmente di natura i nostri più belli colori," &c.—*Saggî, &c.*

That this objection does not spring from any artistic prejudice, may be seen by referring to the *Summary of Modern Colours,* in which

"Even the bleached oil, prepared according to the directions of Cennini, or according to other more perfect processes, would, without due precaution, become yellow in a short time."[22]

The author of the two encaustic pictures, which were discovered in a wet subterraneous apartment of ancient Stabiæ during the last century, as perfect as when they were first painted, nearly 1800 years ago,[23] would be difficult to persuade, could he revisit the arena of Art, that the knowledge of secure vehicles had materially advanced-on being told that a picture of three or four centuries old was considered to have approached the *ultima Thule* of longevity.

Marcus Victorinus, who lived in the middle of the fourth century, mentions a picture of Zeuxis, which was extant at that period—750 years old.

In the *Chemist* of January last, notice is taken of

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many become deoxidized or darkened by being united to drying [plain] oils, which with resins or wax would have preserved their brilliancy and purity.—*Montabert.* This defect is altogether independent of any liability in the oil itself to change or become leathery in colour from the absence of light.

[22] Sir C. L. Eastlake's *Materials, &c.*, p. 273.

[23] "Gli altri due in mezzo all' umido della camera, ed in mezzo all' aria, che penetrava per lo scolo, si conservarono intatti e quasi fossero fatti al di d'oggi."—Requeno, *Saggî, &c.*, i. 184.

Letronne avers that he has proved from Pliny, that the best works of the Greeks were executed in Tempera only.

The works of the Tempera painter can have no more pretensions to the qualities above described, though varnished with the veritable Atramentum of Apelles, than the flat and pannel-like surface of many modern oil paintings can be said to realize the magical effects, so deservedly admired in the best Venetian and Flemish pictures.

a picture ~~of~~ by "Dumas and Persoz" of the thirteenth century—600 years old. "A stucco of wax, which covers the whole of the painting, and whose effect is still very happy, gives to the colours a slightly brilliant appearance, at the same time that it must have contributed to preserve them from the action of humidity."

A SUMMARY OF MODERN COLOURS,

WITH THEIR

CHEMICAL AND ARTISTICAL PROPERTIES.

A SUMMARY OF MODERN COLOURS.

A small portion of the following Summary was printed a few years ago. Since that period a more extensive and varied field for inquiry than had been previously accessible, displayed itself in the contributions of colours and dyes from almost every part of the globe to the Great exhibition. These colours were chiefly arranged among the products of Class 2; and as the author attended their examination as Associate Juror, he has taken the opportunity of transferring to these pages such artistic information as the examination suggested.

Among the novelties brought forward by the Great Exhibition, was a large collection of native Indian Ochres (sent by the Honourable East India Company) of every variety of tint, from the Yellows and Browns common to the ochres of European districts, to the Pinks and Purple-Reds which are less known as pigments, and which are chiefly found in countries believed by geologists to be of an igneous origin. There were other collections of Ochres, also, from Canada and Trinidad. Several varied tints of Green Ultramarine were exhibited;—durable transparent colours, well adapted for the palette; among which was an excellent permanent substitute for Prussian and Antwerp Blue. There were many other mineral colours of great use and beauty; as, Greens prepared from Zinc and Cobalt; a new bright Yellow, Chromate of Cadmium; a subdued Orange from Cerium; a Red from Palladium; a beautiful Rose Pink, and deep rich Purples of varied hues from Cobalt; a Brown from Iron; a new White from Lead (Pattinson's Oxichloride); and several more, of whose existence few had previously known. A series of beautiful Silicates from the Potteries. Various new colours made with Zinc: also rich and powerful glazing colours, chiefly Greens, Browns, and Yellows, prepared with fatty acids; and an artificial Ultramarine Blue, of the prismatic hue, from Alsace, resembling the finest Lapis Lazuli, and responding to the same chemical tests:—an acquisition, of whose value an estimate may be formed, from the fact, that a fine quality of the native pigment, such as is usually sold in the shops at *five guineas* the ounce, was exactly matched by the above example, the manufacture of which (having been repeated with the most perfect success) would be amply remunerated at half that number of *pence* the ounce.

The decisions respecting the merits of the various colours have not been adopted without repeated experiments, both artistical and chemical; and when any difficulty presented itself in the latter mode of scrutiny, the advice and aid of scientific friends were always very kindly afforded.

MODERN COLOURS.

PERMANENT COLOURS.

WHITES.

ZINC WHITE. *Oxide of Zinc.*

This pigment (when properly manufactured[1]) is the only *permanent* White of any value to the artist. Although it is not so powerful in body as White Lead, it may be advantageously used in its place, or in covering and protecting the more solid tints of the lead preparations from the injurious action of sulphuretted hydrogen and other gases, by final paintings or scumblings, thereby preserving the original brilliancy of the painting.

The Sulphates of Baryta and Strontia, and perhaps the Oxide of Tin, may be considered as secure against the action of injurious gases; but since they are too feeble in body, as White pigments, to be of any service to the oil-painter, they have not been arranged in this list.

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[1] It is sometimes adulterated with Carbonate of Lead.

YELLOWS.

STRONTIAN YELLOW. *Chromate of Strontia.*

This colour is produced by adding a solution of the Chromate of Potassa to one of the Chloride of Strontium. Its Yellow is of the true prismatic hue, and, although not so full in body as the Lead Yellows (the Chromates of Lead), the peculiarity of its tint, which is not found in the Yellow Oxides of Iron, will always recommend it where exceeding delicacy and brilliancy are required, either alone, or in mixture with White. Neither intense light, nor oil, nor the most powerfully active gases, have any effect upon the purity of its colour. To produce a very fine tint of this chromate, Chromic Acid may be saturated by Strontia Water.

BARYTA YELLOW. *Chromate of Baryta.*

Prepared in the same manner as the above, substituting a salt of Barium for that of Chromium. It is very similar in tint. This pigment is sometimes called Lemon Yellow.

ZINC YELLOW. *Chromate of Zinc.*

This colour is prepared by a similar process. Its tint is also of the same character.[1]

[1] The Yellows of Chrome and Zinc, and the Greens of Cobalt, were to be seen in several sections of the Exhibition, varying in the bril-

The Chromates of Tin are too feeble in body to be of any service to the painter. The Chromate of Protoxide of Tin is deep Brown; the Chromate of Peroxide of Tin is Yellow.

liancy and variety of their tints. Mr. Brown, of Pimlico, sent no less than twelve yellows, from a pale straw colour (like Naples Yellow) to Canary and Orange Yellow. There was also a semi-opaque Brown among his Zinc colours, and a tint of Grey. Oxide of Zinc (Zinc White) was also sent from many countries, its density and brightness having been greatly improved during the last few years. These Zinc preparations resist the action of foul gases, and do not seem to be affected by light; but they are rather deficient in body, and dry slowly without aid. In all cases where permanency of tint is of more importance than the covering power, the colours of Zinc are to be recommended; but when the covering property or body of the paint is of the first consequence, as in the groundings or substrata of White, either the Carbonate of Lead, or Pattinson's Oxichloride of Lead, is to be preferred. Of these lead preparations, the covering property possessed by the latter, when compared with that of the former, is estimated as 100 to 60.

CADMIUM YELLOW. *Sulphuret of Cadmium.*

A combination of Cadmium and Sulphur; which has also, but very rarely, been found native. A rich Orange Yellow, of excellent body; an admirable addition to the palette.

CERIUM YELLOW. *Oxide of Cerium.*

An Orange Yellow of a subdued tone, contributed to the English chemical department of the great Exhibition by Mr. Button.

YELLOW OCHRE. OXFORD ” ROMAN ” STONE ” BROWN ” INDIAN ” RAW SIENNA	*Native earthy compounds of Silica and Alumina, coloured by Oxide of Iron.*

The Hydrated Oxides and Oxides of Iron constitute many of the staple colours of the palette. When properly washed and prepared for oil-painting, they are incapable of injuring other colours, and may be considered the soundest materials with which the chemistry of nature has furnished the painter for the imitation of her works. The Oxides of Iron (as Jaune de Mars,) which are produced by the chemist's art, are equally durable.

INDIAN COLOURS.—The Indian department displayed a case of Ochreous Earths, chiefly from the peninsula—varying in colour and body. Among them were White Ochre (Porcelain earth) and silvery white Kaolin, for crayons and colours. Pale, bright, and deep Yellow Ochres—Salmon, Cream, Puce, Flesh, Stone, Lavender, and Brown coloured, and Roman Ochres. Sienna, Umbers, Brown and Grey Earths; besides Indian, Venetian, and other Purple-Red earthy Ochres; native Cinnabar, and burnt Ochres, and Siennas. Many of these colours would be very useful to the artist as body-colours, and others would serve for the purposes of glazing. Some possess tints approaching to purple and crimson; a peculiarity which will be very likely to recommend them as a variety among the brown and yellow hues, which are the predominant characteristics of those generally in use. These colours were contributed from the East India House, and, being found in great abundance in their several districts, are available as articles of commerce to any extent. So varied an assortment of natural earthy colours, has probably not been seen before in this country. Trinidad[1] and Canada also contributed several Ochreous Earths, of the usual Brown-Yellow colours, and of Pink and Greyish-blue tints.

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[1] The Pink and Flesh-coloured Ochres from Trinidad, are thus noticed by Dr. Nugent, on his visit to that island. "I was struck with the appearance of a rocky bluff, or small promontory, which I found composed of a substance corresponding to the porcelain jasper of the mineralogist; generally of a red colour where it had been exposed to the weather, but of light slate-blue in the interior; in some places, from the action of the air, it was of a reddish or yellowish brown," &c.—*Geological Transactions.*

The author was informed by the Exhibitor, that these ochres constituted whole sea-shore cliffs, from two to three miles in length—the Guapo Cliffs; and that blue ochreous stone or earth, was found in the caverns, in striated masses, or seams.

MADDER YELLOW. *A Vegetable Dye on an Earthy Base.*

The colours manufactured from the Madder Root have recently obtained so high a reputation for durability, among artists and even men of science, that their introduction among the permanent pigments could scarcely be avoided. It may be as well to remark, however, that all Vegetable Colours, whether they are produced from flowers, leaves, roots, gums, or barks, should, as a general, if not an exclusive rule, be looked upon with suspicion.

In deep rich glazings the evanescence of such colours will be less perceptible than when they are employed in thin coverings, or in tint with white or other pigmental diluents, by which the colouring matter is more thoroughly spread out, and exposed to the action of light.

REDS.

VERMILION. *Sulphuret of Mercury.*

Mercury and Sulphur sublimed together. The fine colour is developed by a subsequent complicated process.

Vermilion, called Chinese, is not unfrequently made from Arsenic. Sulphurets are said by some chemists to injure other colours.

Cinnabar, or Native Vermilion, blackens in oil, and was believed by the ancient Romans (see Vitruvius, &c., in *Ancient Colours*,) to be injured by light.

INDIAN RED.	*Oxides of Iron.*
VENETIAN RED.	
COLCOTHAR.	
BURNT OCHRES, AS LIGHT RED, &c.	

These colours possess the same durable characteristics as the Hydrated Oxides of Iron.

PURPLE OF CASSIUS. *The Oxides of Gold and Tin.*

A beautiful permanent colour, but very expensive. Lilac and Crimson Silicates are made from Gold, and employed in the potteries, and for glass. They have not much body, but might, on account of their reputation for durability, be very acceptable to those artists who have little confidence in the Vegetable Lakes and Crimsons. Sir Humphrey Davy says,—"It is worth while trying whether the beautiful Purple colour given by Oxide of Gold, cannot be made useful in painting, in a densely tinted glass."[1]

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[1] *Colours of the Ancients.* The same author also says: "It is unfortunate that frits, or unalterable metallic combinations, have not been the only pigments employed by great artists," &c.; and again: "The principle of the composition of Alexandrian Frit is perfect: a species of Lapis Lazuli, the colouring matter imbedded in hard silicious stone." Through the kindness of Dr. Layard, the author has taken many opportunities of testing this celebrated Silicate of Copper, Alexandrian or Assyrian Frit; and when thoroughly washed and pulverized, he has always found it to turn green and darken when mixed with oil; an evidence that vitrification does not render the colour proof against chemical action. Mr. Field, in his *Chromatography*, says that Smalt (Royal Blue), another vitreous colour, soon loses its beauty in oil, "as is no uncommon case with other vitrified pigments." And he elsewhere remarks, "that finely ground vitreous colours are subject to all the changes and affinities of the substances which compose them."

MADDER REDS. *Vegetable Dyes on Earthy Bases.*

The Madder Reds have similar properties to the Yellow and other colours of this root.

MINERAL LAKE. *Tin and Chromium.*

A Lake or Purple colour, not powerful in body, but said to be permanent. Its tint resembles Madder Brown.

BLUES.

NATIVE ULTRAMARINE. *Prepared from Lapis Lazuli.*

Ultramarine essentially consists of Silica, Alumina, Soda, and Sulphur. It is regarded as a compound of Silicate of Alumina and Silicate of Soda, with Sulphuret of Sodium; and the colour is thought by some to be entirely owing to the reaction of the latter on the two former constituents; while others believe that an infinitesimal portion of Iron, almost always found in combination with these bodies, has much to do in the development of the *Blue* tint of Lapis Lazuli.

ARTIFICIAL ULTRAMARINE. *A Chemical Production.*

An admirable and cheap substitute for the native colour, when it can be obtained of the pure prismatic Blue tint, of which an excellent specimen from Rixheim appeared in the Great Exhibition.[1] The artificial Ultramarines prepared for the calico printers, being of a Violet or Purple hue, are incapable of answering the purposes of the genuine Atmospheric Blue which the artist requires. The addition of Yellow to the ordinary Purple Ultramarine of commerce produces a neutral tint, as the Red, which the latter contains, unites with the Blue and Yellow to complete that negative colour.

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[1] Contributed by Zuber and Co.

COBALT BLUE. *Silicate of Cobalt and Potassa.*

A beautiful colour, but without the depth and body of Ultramarine.

Smalt.—Another form of the same colour, is, like the Egyptian Blue, a coloured glass. It has, of course, less body than Cobalt Blue.

Thenard's Blue.—Consists of Phosphate of Cobalt with Alumina.

BLUE OCHRE. *A Native Earth.*

Phosphate of Protoxide of Iron. Native Ochres of subdued Blue tints are found in various parts of the globe :—in England, Canada, Trinidad, &c.

GREENS.

CHROMIUM GREEN. *Sesquioxide of Chromium.*

An opaque Green, of a full body; an important accession to the palette. This pigment, which is made of different degrees of intensity, forms the colouring matter of the Emerald.

THE ULTRAMARINE GREENS. *Chemical Preparations.*

These Greens are formed during the process of making Ultramarine; and are believed to be equally durable. The Great Exhibition furnished several tints of them.

Among the darkest specimens was a permanent substitute for Prussian and Antwerp Blue, those useful but uncertain pigments. These colours are feeble in body, but well calculated for Blue Green glazings. Their money value, like that of the best Rixheim pure Blue Ultramarine, is too inconsiderable to check the most profuse employment of them.

TERRE VERTE. *Silicate of Protoxide of Iron, &c.*

Silicate of Protoxide of Iron, with Water, Potassa, and Magnesia. A deserved favourite with most painters. When calcined, it forms another beautiful pigment called *Verona Brown.*

ZINC OR COBALT GREEN. *Oxides of Zinc and Cobalt.*

This colour, of which there were some good specimens in the Great Exhibition, appears to have more body than any of the other colours made with Zinc. England, Saxony, and Holland, displayed specimens. It resists change from oil, light, and foul airs. It is also called Rinman's Green.

BROWNS.

UMBER. *An ore of Iron containing Manganese.*

An useful colour, whether native or calcined; and possessing a strong drying property.

Vandyke Brown
Cappah "
Rubens "
Cassel "
Cologne "

Decomposed Vegetable with Bitumenous Matter.

Vandyke.—A deep transparent colour in much use at the present day.

Cappah.—The best is deep, rich, and transparent. It is a Manganese Peat, and a strong drier; from Cappah, near Cork.

Rubens.—A native earth of an ochreous character.

Cassel.—A similar earthy Brown.

Cologne.—An ochreous deep Brown colour.

Manganese Brown. *A Deutoxide of Manganese.*

A deep semi-opaque colour; an excellent dryer.

⁂ The opacity which pictures too often display in the darker colours after a lapse of time, is more owing, perhaps, to a loss of the light ground from negligent or repeated paintings, over which the deep shadows should be wrought, or to the poverty of the vehicle employed, than to any degradation in the Browns themselves. Tested rigidly, the tendency of these pigments is to bleach.

ASPHALTUM. *Bitumen.*

A rich transparent Brown, liable to crack without some unctuous or waxy accompaniment. A mineral pitch or resin, found floating on the Dead Sea; procured also in the distillation of Natural Naphtha.[1]

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[1] "Fluid Bitumen is seen to ooze from the bottom of the sea, on both sides of the island of Trinidad, and to rise up to the surface of the water." "The frequent occurrence of earthquakes and other indications of volcanic action in those parts, lend countenance to the opinion, that these vegetable substances [woody, &c. bodies carried down rivers] may have undergone, by the agency of subterranean fire, those transformations and chemical changes which produce petroleum, and may, by the same causes, be forced up to the surface, where by exposure to the air, it becomes inspissated, and forms the different varieties of pure and earthy pitch, or asphaltum, so abundant in the island."—Lyell's *Elem. of Geol.*, p. 219; also Dr. Nugent, in *Geolog. Trans.*, vol. i.

MUMMY BROWN. *Bitumenous.*

White Pitch and Myrrh with animal matter. Another rich transparent Brown, less subject to crack than Asphaltum.

MADDER BROWN. *A Vegetable Dye, &c.*

This pigment has properties similar to the Reds and Yellows of Madder.

Other Browns.—Coarse Browns, Oxides of Copper as well as of Iron, of great durability, are made by the chemists, but they are not needed for Fine Art purposes.

BLACKS.

IVORY BLACK. *Carbonized Ivory.*

Of a Brownish-Black tint.

BLUE BLACK. *Carbonized Vegetable Matter.*

Burnt Vine twigs, Cocoa-nut shells, &c., furnish a Bluish-Black tint Common Blacks mixed with uncertain Blues are sometimes substituted by empirics. Frankfort Black is made from the lees of wine; (the Blue Black of antiquity).

BONE BLACK. *Carbonized Bones.*

Of a Brownish-Black tint.

MANGANESE BLACK. *Peroxide of Manganese.*

A native product. It may be prepared artificially from the Nitrate, by exposing that salt to heat. It is a good drier.

LAMP BLACK. *Pure Carbon.*

A perfect Black, but a bad drier. The soot of burnt Resin and Turpentine. There are Black Ochres, native earths, but they are not now in use, nor are they required.

OBJECTIONABLE COLOURS.

WHITES.

Flake White. *Carbonate of Lead with Hydrated Oxide.*

This pigment is made by exposing plates of Lead to Vinegar-steam in beds of fermenting tan. It is blackened by Sulphuretted Hydrogen, by Hydrosulphuret of Ammonia, and other injurious gases, which are in a greater or less degree common to most domestic atmospheres; to protect it from which, a superstratum of Zinc White tints, or a rapidly drying vehicle of a firm and innocuous character, is requisite for the preservation of its brightness.[1] When free from adulteration (by Baryta, &c.) it is perfectly soluble in dilute nitric or acetic acid. Blanc d'Argent, Krems, Roman, Venetian, &c. Whites, are but other names for the same preparation.

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[1] If oil be used in excess, the picture will degrade to a yellow or foxy hue; but when the White Lead is not overcharged with oil, its deoxidation becomes more evident, the colour it assumes being that approximating to metallic lead itself. This may suggest to the artist the prudence of adopting a scale of colour, which will enable him to charge his highest lights with hues whose warmth shall effectually conceal the unavoidable blackening of this pigment. Colouring so conducted, will, by time, result in that low-toned brightness which Reynolds admires:—cold White Lead must inevitably degrade to a slaty or leaden hue.

YELLOWS

MASSICOT. *Protoxide of Lead.*

Like the last named pigment, from which it is derived, it blackens with foul air.

CHROME YELLOW. *Chromate of Lead,*
and
CHROME ORANGE. *Subchromate of Lead.*

Prepared by decomposing the Nitrate or Acetate of Lead by the Chromate or Bichromate of Potash. These brilliant pigments, like all Lead colours, have a good body, but are injured by foul gases. The number of permanent bright Yellows now available renders them unnecessary. Jaune Mineral is another objectionable colour of the same class.

REDS.

RED LEAD. *Red Oxide of Lead.*

Calcined Massicot: the Red Oxide of Lead, or Minium,—Carbonate of Lead decomposed by heat. This colour blackens in oil.[1] Oils, in drying, absorb oxygen, both from the circumambient air and from the materials with which they may be combined, if the latter should contain oxygen. Used thinly in pictures, these drying oils become resinified throughout their substance. Metallic Oxides, which are employed as pigments, especially such as have little affinity for oxygen, are liable to part with it the more readily to a drying-oil (as linseed, nut, poppy, &c.) in its process of siccation, thereby darkening or restoring the pigment to its original metallic condition. Upon the same principle the highly charged oxide, Litharge, by the aid of heat, gives out its oxygen to the drying-oil with which it is boiled, in order to further increase the siccative power of the Oil. Red Lead has also the additional objection belonging to all *Lead colours*, viz., that of being liable to the injurious action of foul vapours.

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[1] "The greater number of fixed oils, by exposure to air, become viscid and rancid. In this state they contain free acid."—Prof. Brande's *Elements of Chemistry*. See also Prof. Tingry *On Varnishes*. The effect likely to be produced on colours by this uncombined acid may prove injurious.

PALLADIUM RED. *Ammonio-Perchloride of Palladium.*

A rich, powerful, and beautiful colour, very slightly affected by sulphuretted hydrogen gas, and by oil.

GREENS.

MALACHITE. *A Native Carbonate of Copper.*

When a salt of Copper is precipitated by an alkaline Carbonate, a Hydrated Dicarbonate is produced. Malachite is of this composition. The Ural Mountains and South Australia furnished abundant specimens to the Great Exhibition. It becomes greener and darker in oil.

SCHEELE'S GREEN. *Arsenite of Copper.*

This colour is acted upon by sulphuretted hydrogen gas, but does not change in oil to the same extent as the more delicate Greens of Copper.[1] Emerald Green is another bright Copper Green of similar properties. The less, however, these Greens of Copper are resorted to, the better. According to Montabert, the injuries to which they are subject, when in combination with oil, have no existence when in combination with wax or resin.

Gambogiate of Copper.—A rich Olive Green.

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[1] Similar Greens and Blues are obtained by combining the oxides of Copper with fatty acids, as the Oleic and Elaidic. These Copper Oleates and Elaidates possess the same defects when mixed with oil, as the Arseniate, Acetate, Carbonate, &c. of Copper. But there are *permanent* transparent Oleates of much beauty, namely, a rich Brownish Red colour from Iron, a bright Yellow from Tin, a Buff-Yellow from Zinc, a Yellow also from Cadmium, and one from Manganese, which are well adapted for thin glazing colours. This process is the invention of Mr. Charles Humfrey. Specimens were arranged in the Chemical Department of the Great Exhibition.

BROWNS.

IVORY AND BONE BROWNS. } *Bony Matter partially calcined.*

These colours are not considered so durable as when the process of calcination has been carried to its maximum, and the Browns have become carbonized, or changed into Blacks.

PRUSSIAN BROWN. *Ferrocyanide of Copper.*

Prepared by the addition of the Yellow Prussiate of Potash to Sulphate of Copper. A rich Chocolate Brown, slightly affected by sulphuretted hydrogen gas, and totally destroyed by the alkaline solutions which are frequently used as abstergents in picture-cleaning.[1] Chromate of Potassa, with Sulphate of Copper, will yield a Brown of a similar colour to that of Madder.[2]

Prussian Blue, when calcined, becomes of a fine Brown colour. It is troublesome to prepare for use, otherwise it is not an ineligible pigment for the artist.

Catechu Brown.—An exceedingly rich, transparent, and beautiful Brown (kindly prepared for the author from the Catechu bark, some years ago, by Dr. Lyon Playfair) would, when not too thinly applied, prove a most desirable addition to the Colour List. When closely observed, even the so-called permanent Browns are all more or less liable to be deprived of their colour by the action of light.

Gambogiate of Iron.—Dr. Scoffern read a paper, at the meeting of the British Association of Science, in 1851, describing this combination as a rich Brown, like Asphaltum, being richer, as well as more durable, in oil. The Gum Resin is dissolved in ether and distilled.

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[1] Alkalis decompose or destroy the materials used as vehicles in painting.

Oils are destroyed by Alkalis.

"Resins and Wax are decomposed only ;—they may be recovered by Acids."—*Dr Turner.*

[2] Peroxide of Uranium, with Ferrocyanuret of Potassium, gives a bright Brown also.

REJECTED COLOURS.

WHITES.

Bismuth, *Pearl*, *Antimony*, *Arsenic*, and *Mercury*, yield Whites, which are injured by foul airs and by light. They are too feeble in body for the palette.

Sulphate of Lead is equally useless in oil.

YELLOWS.

Naples Yellow.—This colour is produced by an union of the Oxides of Lead and Antimony. It is readily affected by sulphuretted hydrogen gas, by light, and by moist iron.

Turpith Mineral, or Subsulphate of Mercury, a rich Orange Yellow, is very rapidly blackened by light, the deoxidizing power of oil, and sulphuretted hydrogen gas.

Chromate of Mercury, a dull Orange Red, is also injured by light and alkalis.

Orange Orpiment or *Realgar*, and *King's* or *Chinese Yellow* (*Yellow Orpiment*), Sulphurets of Arsenic, are affected by light and injurious to other colours.

Patent Yellow, an Oxichloride of Lead:—Lead and salt violently heated. It is injured by sulphuretted hydrogen gas.

Platinum Yellow, Ammonio-chloride of Platinum, a subdued Orange colour; is destroyed by foul airs and darkened by light.

Oxide of Uranium, a new and very beautiful colour; is deoxidized or darkened by light, though not affected by sulphuretted hydrogen gas.

Yellow of Iodide.—Davy says: "It is a beautiful colour, and will last *several* MONTHS!"

Chromate of Cadmium, a bright Yellow, of good body and much beauty; darkens in oil.

Golden Sulphuret of Antimony; is injured by alkalis and oil.

Chromate of Tin, a bright Yellow; is powerfully degraded by oil.

Palladium Yellow, Ammonio-chloride of Palladium; is slightly blackened by foul air and oil, but it is void of body, and almost useless as an oil-colour.

Gamboge is reddened by alkalis, and bleached by light.

The Vegetable Yellows—Indian Yellow, Brown-Pink, &c., &c.,—belong to the most evanescent class of colours.

REDS.

Peroxide of Mercury, or Red Precipitate, is worthless, as it blackens by foul air and light, and is deoxidized by oil.

Iodide of Mercury is affected by sulphuretted hydrogen gas, and is changed and blackened by oil.

Phosphate of Cobalt; a beautiful Pink colour, darkens in oil; and the pink hue disappears.

Dragon's Blood,—A resinous colour from the East; it is enfeebled by exposure, but is not injured by foul airs.

The Vegetable Reds, Lakes, Cochineal, &c., are quickly discharged by exposure to light. Since the destruction of many colours by the action of light cannot be obviated by any selection of vehicle, the artist has no alternative but to reject them altogether.

BLUES.

Prussian Blue.—Both the ferro- and ferrid-cyanuret of the Peroxide of Iron, and Antwerp or Mineral Blue (the same colour with Alumina), are subject to change from light, oil, alkalies, and other baneful influences. It is a rich and fascinating pigment to the colourist, but not to be depended upon; and yet difficult to avoid.

Indigo is inferior in colour, and fades rapidly in the light.

Verditer, and all the *Copper Blues*, are very unstable in oil, as they turn green and darken by deoxidation.

GREENS.

The Copper Greens.—The Arseniate, Phosphate, Carbonate, Disulphate, and Acetate of Copper, with Mineral Green, Verditer, and Verdigris Greens, are blackened by foul air, and deoxidized or darkened, and made greener, by oil.

Nickel Green, or Arseniate of Nickel, resists the action of foul airs, if pure, but turns greener and blackens in oil.

⁂ Montabert says, that Gamboge, Verdigris, Chrome Yellow, Minium, Massicot, Orpiment, Cendres bleues et vertes, Verona Earth, (Terre Verte,[1]) and all the oxides which are altered more or less by oils, are quite safe in wax vehicles.

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[1] Genuine Terre Verte is not a Copper Green, as would seem to be implied here, and is quite permanent in Oil.

METALS

WITH THE COLOURS PRODUCED FROM THEM.

Aluminium.

Antimony.—Protoxide of, (White). Persulphuret of, (Golden Sulphuret of Antimony). Sulphuret of, boiled in potassa, and by other modes, (Kermes Mineral Red). Oxide of, with Oxide of Lead, (Naples Yellow).

Arsenic.—Sesquisulphuret of, (Orpiment, or King's Yellow). Sulphuret of, (Realgar).

Barium.—Sulphate of Oxide of, (White). Chromate of Oxide of, (Pale Yellow). Uranate of Oxide of, (Orange Yellow).

Bismuth.—Subnitrate of Oxide of, (Pearl White).

Cadmium.—Sulphuret of, (Orange). Chromate of, (Yellow).

Calcium.

Cerium.—Peroxide of, (Fawn Yellow).

Chromium.—Sesquioxide of, (Green).

Cobalt.—Silicate of, and Potassa, (Smalt; and Cobalt, or Lickner's Blue). Oxide of, and Oxide of Zinc, (Rinman's Green). Phosphate of, with Alumina, (Thenard's Blue). Arsenite of, (Purple). Silicate of, (Pink).

Columbium.—Oxide of, with Protoxides of Iron and Manganese, (Brown).

Copper.—Oxide of, (Red). Phosphate of, Acetate of, and Arseniate of, (Pale Turquoise Blue). Diacetate of, (Verdigris). Carbonate of, (Greenish Blue). Disulphate of, and Soda, (Mineral Green). Arsenite of, (Scheele's Green). Dicarbonate of Oxide of, (Malachite). Sulphate of, and Prussiate of Potash, (Prussian Brown). Silicate of Oxide of, (Blue). Hydrated Oxide of, with Lime, (Verditer).

Gold.—Protoxide of, with Peroxide of Tin, (Purple of Cassius).

Glucinium.

Iridium.—Oxides of, and Ammonio-Chloride of, (Blacks).

Iron.—Oxides and Hydrates of, (Reds, Yellows, and Browns). Ferrid and Ferrocyanuret of, and Potassium, (Prussian Blue); the same with Alumina, (Antwerp Blue). Phosphate of Protoxide of, (Blue Ochre). Silicate of Protoxide of, with Water, Potassa, and Magnesia, (Terre Verte).

Lantanium.

Lead.—Carbonate of, with Hydrated Oxide, (Flake White). Sulphate of, (White). Protoxide of, (Massicot). Plumbate of Oxide of, (Minium, or Red Lead). Oxichloride of, (Patent Yellow). Neutral Oxichloride of, (Pattinson's Oxichloride). Chromate of, (Yellow). Sub and Dichromate of, (Orange and Red). Tungstate of, (White).

Lithium.

Manganese.—Deutoxide of, (Black). Intermediate ditto, (Brown). Protoxide of, (Greyish Green).

Mercury.—Peroxide of, (Red Precipitate). Subsulphate of, (Turpith Mineral). Chromate of, (Orange). Bisulphuret of, (Vermilion). Native Bisulphuret of, (Cinnabar). Iodide of, (Scarlet); also (Yellow —*Davy.*)

Molybdenum.

Nickel.—Arseniate of, (Green).

Osmium.—A solution of Bichloride of, heated with Carbonate of Soda, (Deep Brown).

Palladium.—Ammonio-chloride of, (Yellow). Ammonio-perchloride of, (Red).

Platinum.—Ammonio-chloride of, (Yellow).

Potassium.

Rhodium.—Chloride of, (Red). Peroxide of, (Yellow).

Sodium.—Silicate of Alumina and Soda, with Iron and Sulphur, (Ultramarine Blue); also, by artificial process, (Ultramarine Blues and Greens).[1]

Selenium.—Bisulphuret of, (Orange).

Silver.—Nitrate of, and Arseniate of Soda, (Red). Phosphate of, (Yellow), Neutral Chromate of, (Deep Red).

Strontium.—Sulphate of, (White). Chromate of, (Yellow).

Tellurium.

Thorium.

Tin.—Peroxide of, (White). Chromate of, (Yellow). Peroxide of, and Chrome combined, (Mineral Lake). Persulphuret of, (Mosaic Gold).

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[1] These Greens consist of Ultramarine which has not been roasted: when roasted they become Blue.

Titanium.—Ferrocyanide of, (Orange, Brown, Green, from the Iron in the Prussian Blue).

Tungsten.

Uranium.—Peroxide of, (Yellow). Peroxide of, and Ferrocyanuret of Potassium, (Brown Red).

Vanadium.

Yttrium.—Hydrate of, (White). Chromate of Oxide of, (Yellow).

Zinc.—Oxide of, (White). Oxides of Zinc and Cobalt, (Green).

Zirconium.—Sulphuret of, (Brown).

AUTHORITIES

QUOTED, REFERRED TO, OR CONSULTED, RESPECTING "ANCIENT AND MODERN COLOURS."

ANCIENT.

	B. C.
The Bible.	
Homer	850
Anacreon	474
Euripides	407
Thucydides	391
Aristotle	322
Theophrastus	288
Galen	110
Tacitus	108
Cæsar	44
C. Nepos	25
Dioscorides	23
Virgil	20
Vitruvius	15
Horace	10

	A. C.
Ovid	10
Celsus	20
Pliny	75
Statius	95
Arrian	140
Pausanias	170
Pollux.	
Aetion.	
Cassiodorus.	
Colonna.	
Victorinus.	
Orpheus.	

MODERN.

FOREIGN.

Beckmann.
Botta.
Caylus.
Chaptal.
Descotils.
Dutens.
Flandrin.
Gensenne.
Girardin.
Harduin.
John.
Lehmann.
Letronne.
Marcet.
Montabert.
Müller.
Raspe.
Requeno.
Scaliger.
Tingry.

BRITISH.

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&c. &c. &c.

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